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ECHINOCOCCUS CYST OF THE ORBIT IN A CHINESE.

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Echinococcus disease has rarely been reported in China. Altho twelve cases have been observed at the Peking Union Medical College Hospital, this is the only case involving the orbit, which was exenterated. A full pathologic report is given, and the points from which a diagnosis may be made.

China has often been referred to as a land of children; no matter where travellers go, children are seen everywhere. On similar evidence China might be called a land of dogs. There are no trustworthy population statistics in China, but the number of children under the age of eighteen may roughly be estimated at one hundred and seventy millions. There are also no statistics regarding dogs, but their number is probably not less than the number of children. From the writer's own observations he would estimate that about every third Chinese family has one dog, another third two or three, and the last third six to a dozen. Furthermore, every village and city harbors many homeless dogs, from the favorite chow to his mongrel cousin.

In Mongolia and that part of North China adjacent to Mongolia, sheep are raised extensively. The combination of dogs and sheep in certain parts of the world is sufficient to make the incidence of echinococcus, or hydatid cyst, among humans not uncommon. The primary or definitive hosts of *Taenia echinococcus* are chiefly dogs, jackals and wolves, i.e., the adult forms of these small tapeworms are found in the small intestines of these animals, of which the dog is the optimum host. The larval or intermediate hosts include man, cattle, hogs, and sheep, the latter being the optimum host. Human infestation occurs thru close association with infected dogs. This is brought about chiefly thru the drinking of water and the eating of raw vegetables, which have been contaminated by dust containing ova of this cestode from dogs' feces. Human infestation also occurs thru dogs licking the hands, faces, and dishes of humans. Sheep and cattle become infested chiefly by eating grass and drinking water containing the ova. The raw offal of infested sheep and cattle contains echinococcus cysts. Dogs eat the infested offal of slaughtered animals, and become infected, developing in time the adult worms. Thus the cycle is completed, and repeated ad infinitum.

The conditions in northernmost China and in Mongolia would seem to favor a widespread incidence of the disease in those localities. However, a careful search of the literature fails to reveal more than one reference to the existence of the disease among Chinese. Moreover, this single reference is merely a brief quotation from a hospital report by Peake[1] of Tientsin, who simply mentioned an operation he had performed upon a Chinese in 1917 for hydatid cyst of the liver. But the lack of references in the literature cannot be accepted as an indication of the nonexistence, or practical nonexistence, of hydatid disease in China. In view of the low status of modern medicine in China and Mongolia as a whole, it means nothing.

The regions from which the hospital of the Peking Union Medical College draws its patients are not noted for sheep raising. If, therefore, it can be shown that this hospital occasionally admits a case of echinococcus (or hydatid) cyst from the environs of Pe-

king, it means not only that the disease exists in China but also that one might find the disease not uncommon in the sheep raising country farther north. Concerning these points the evidence is herewith produced:

The hospital records of the Peking Union Medical College show that during the decade, 1916-1926, twelve cases of echinococcus cyst were admitted to the wards, and definitely diagnosed, either by operation, pathologic finding, or on sufficient clinical evidence. It is quite probable that other cases of echinococcus came only to the outpatient department, and either were not diagnosed or refused to enter the hospital for confirmation of suspected echinococcus disease and treatment. In Table I the data pertaining to the twelve cases are given. In eleven of them the liver was involved; in two of those in which the liver was involved the spleen and abdominal cavity respectively were also involved. In one case only the orbit was involved. It is this case with which this paper is chiefly concerned.

CASE REPORTS

History: A Chinese farmer, Wei Chung Ju, aged 42, was admitted to the hospital of the Peking Union Medical College on May 11, 1923, with a large, unsightly tumor protruding from his left orbit. The first sign of the tumor was an exophthalmos which began about three years before. The protrusion increased very slowly, but was not associated with impairment of vision and pain until about three months before coming to us, when the tumor began to grow rapidly and the vision of the eye to diminish, until blindness ensued. He had recently suffered occasionally from headache.

Examination: The patient was a muscularly developed, well nourished man, whose general physical examination gave negative findings. The blood Wassermann was negative; the urine was normal. The blood hemoglobin

TABLE I.

ECHINOCOCCUS CYST CASES
PEKING UNION MEDICAL COLLEGE HOSPITAL
1916-1926 (10 Years)

No.	Sex	Age	Occupation	Native Province	Location Cyst	Duration Symptoms Years	Percentage Eosinophilia	Operation	Fluid Withdrawn c.c.	Pathologic Findings	Final Result
*1.	M	47	Coolie	Chihli	Liver	2	8.3	No	None	None	Not treated
2.	M	38	Brass worker	Chihli	Liver	2½	6.0	Yes	1900	Many hooklets	Improved
3.	M	35	Cook	Chihli	Liver	4	5.0	No	700	Hooklets	Not treated
4.	M	45	Coolie	Chihli	Liver	8	7.0	Yes	Yes	Many daughter cysts	Improved
5.	M	54	Watch repairer	Chihli	Liver	3	10.0	Yes	3000	Fluid and debris	Improved
**6.	M	31	Coolie	Chihli	Liver	3	3.0	No	None	None	Refused operation
7.	M	37	Soldier	Chihli	Liver	1½	2.0	No	None	None	Refused operation
8.	M	42	Farmer	Chihli	Orbit	3	3.0	Yes	110	Hooklets and daughter cysts	Well
9.	M	25	Coal dealer	Chihli	Liver & Spleen	½	0.5	Yes	4000	Many hooklets	Died
10.	M	29	Clerk	Chihli	Liver	1	2.0	Yes	2000	Sterile cyst	Improved
11.	F	19	Housewife	Mongolia	Liver	7	5.1	Yes	4000	Scolices and daughter cysts	Improved
12.	M	27	Soldier	Chihli	Liver & abdominal cavity	5	4.0	Yes	1000	Daughter cysts	Improved
						Average Summary					
Male 11 Females 1		36	Various	Chihli 11 Mongolia 1	Liver 11 Spleen 1 (counted twice) Orbit 1	3.4 yrs	4.7%	67%	75%	75%	6 Improved 4 Not treated 1 died 1 cured (radical)

*Diagnosis made on the high eosinophilia, percussion wave, rapid development o the mass, absence of cachexia, etc.
**Complement fixation test for echinococcus cyst strongly positive.

was 80%; w. b. c., 8,700; r. b. c., 4,630,000; the differential count show polymorphonuclears 69, small lymphocytes 19, large mononuclears 9, and eosinophiles 3.

The right eye was myopic, with an uncorrected vision of 6/30; otherwise quite normal.

A large mass completely filled the left orbit and protruded forward for a distance of 5 cm. from the external margin of the orbit. The tumor, which measured 7 cm. horizontally by 6.5 cm. vertically, could not be moved about in the orbital cavity. A fluctuating thrill was elicited by palpation, which, in addition to the tension and the resilience of the mass, gave the impression that there was fluid within the tumor under considerable pressure. The upper lid was tightly stretched horizontally and entirely covered the cornea and bulbar conjunctiva, while the lower lid was completely everted and pulled backward beneath the tumor, leaving the entire lower palpebral conjunctiva exposed and markedly stretched. The tumor had evidently grown chiefly from behind and below the eyeball, which had been pushed wholly out of the orbit. The globe was displaced 3 cm. temporally, 1.5 cm. upward, and 4 cm. forward from its normal position. The horizontal width of the palpebral fissure was 5 cm. and the distance between the widely separated lid margins was 3.7 cm. The exposed conjunctiva was red, swollen, and ulcerated, and covered with a small amount of purulent exudate mixed with a little bloody serum, which oozed from several patches of granulation tissue. The cornea showed general opacification and pannus. When the upper lid was elevated the eye was found to have faint light perception. (See Figs. 1 and 2.)

Fig. 1. Male, aged 42, showing side view of echinococcus cyst of left orbit, of three years duration.

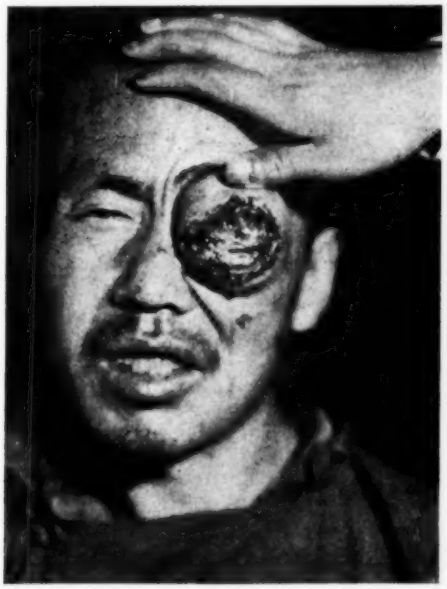

Fig. 2. Front view upper lid, elevated to reveal position of eyeball.

Three possible causes of the tumor occurred to us, namely, a tear cyst, a meningocele, and a mucus retention cyst. The dislocation of the eyeball upward and outward made it seem most unlikely that the cystic fluid came from the lacrimal gland. An x-ray examination of the orbit revealed no bony changes. This negative finding combined with the lack of pulsation, and the fact that the eye was displaced upward rather than downward, was strong evidence against the existence of a meningeal fluid tumor. A retention cyst seemed just as unlikely. We

therefore decided to aspirate some of the fluid for diagnostic purposes.

The needle was inserted above and to the nasal side of the displaced eyeball, and directed downwards and backwards. There was only slight resistance to the entrance of the needle, but a clear, watery fluid began to push the glass piston out with considerable force almost as soon as the needle had penetrated the skin. The size of the mass decreased steadily as the fluid, up to a total of 85 c.c., was withdrawn (see Fig. 3). The last few c.c. contained some flocculi and were slightly clouded. The odor of the fluid was not unlike that of placenta. The patient was watched carefully during the aspiration of the fluid, but he developed no headache, vertigo, or nausea — symptoms which he certainly would have had if the fluid had been intracranial in origin. Sixteen hours later the tumor was restored to its original size and tension. A pressure bandage was then applied, which had the effect of appreciably reducing the mass both in size and tension by the following morning.

Part of the fluid was sent to the laboratory of biochemistry. The following report, submitted by Dr. Hsien Wu, includes comparative analyses for cerebrospinal fluid and tears:

	The cystic fluid (per 100 parts)	Cerebrospinal fluid	Tears
NaCl	0.37	0.60-0.70	1.3
Glucose	0.03	0.04-0.09	...
Nitrogen	0.055	0.02-0.07	...

From its chemical analysis the cystic fluid was analogous to cerebrospinal fluid, but in view of the total lack of subjective symptoms following the sudden and complete withdrawal of fluid, the cyst certainly could not be diagnosed as a meningocele. A microscopic examination of the sediment of the fluid was then made, and a large number of echinococcus hooklets and scolices were found. The tumor, therefore, was an echinococcus cyst of the orbit.

Since echinococcus cysts had occasionally been found in the liver and the lungs of Chinese patients, careful manual and x-ray examinations were made of the patient's abdomen and chest, but no cysts were demonstrated in those parts. In view of the size and duration of the cyst, the apparent disintegration of much of the retrobulbar structures, and the almost complete loss of vision of the eye involved, total exenteration of the orbit was deemed the only feasible form of treatment. This operation was performed by the writer on May 21, 1923, in the following manner:

About 30 c.c. of amber colored fluid were first aspirated from the cyst, in order to facilitate its removal. The external commissure was then split back to the bony orbital margin, and the internal commissure to the lacrimal bone. Incisions (extending from the inner to the outer canthus) were made thru the skin of both upper and lower lids, about 2 mm. from the lid margins. The skin of both lids was then dissected back to the bony margin of the orbit; and the entire tumor, together with the eyeball, the lid margins with the eyelashes, and the extraocular muscles including the levator, was separated by blunt dissection and removed from the orbit. Care was taken not to injure the periobita. After bleeding had been controlled, and all fragments of loose tissue removed, the edges of the greatly stretched skin of the lids were approximated with several fine silk sutures. Fortunately the amount of skin was sufficient to cover the denuded area, with the exception of about a square centimeter at the apex of the orbit. The orbit was carefully packed with gauze in order to hold the skin into apposition with the bone, and a moderate pressure bandage was applied.

The dressings were changed daily. For the first few days the dressings were soaked with a serosanguinous fluid. A little of the skin became necrotic and sloughed off, but applications of mercurochrome stimulated the growth of granulation tissue as a base for epithelial extension. Five weeks after the operation, the orbit was covered completely with healthy skin (see

Fig. 4). The patient was then discharged, and has not been heard from since.

PATHOLOGIC REPORT.

Gross examination: The specimen is an oval shaped mass, which includes an eyeball, the eyelash margins of both lids, and all the tissues of one orbit. Weight, 87.5 gms. (30 c.c. of fluid were withdrawn just prior to removal of the tumor). Length, 7.0 cm.; width, 5.0 cm.; height, 5.5 cm.

Fig. 3. Front view immediately after aspiration of 85 c.c. of echinococcus fluid.

Fig. 4. Final result following exenteration of orbit.

The specimen was hardened in Müller's fluid and subsequently transferred to 80 per cent alcohol. The upper eyelid was split vertically in the median line, and the two parts were retracted in order to expose the eyeball behind, which was found solidly imbedded in a mass of tissue. The eyeball was bisected equatorially, and the anterior segment was removed, leaving the posterior part *in situ*. The anterior segment was cut sagittally into two unequal parts; the smaller part to be prepared for paraffin sectioning, the larger for celloidin. A small amount of straw colored fluid escaped from the vitreous chamber, but there remained behind a dark amber colored vitreous body, which more than half filled the chamber.

The main specimen was cut into from its superior surface, in a frontal plane lying about an inch behind the eyeball. A large cystic space, with a wall averaging about 0.5 cm. thick, was thereby exposed. About 10 c.c. of straw colored fluid with some flocculent sediment were removed from this cystic space. A segment of the upper wall of the cyst was removed, exposing a cavity about 4 cm. in diameter. Within this cavity an irregularly globular mass, about 2.5 cm. in diameter, was found. This mass was easily removed. Upon being bisected, it was found to be a shriveled unilocular cyst with a well marked capsule (see Fig. 5). The cyst contained a greenish yellow coagulum of waxy appearance and stiff jelly like consistency. Attached to the inner margin of the capsule at several places were quite a number of small, light brown nodules which looked like hydatid sand. The character and appearance of this irregular mass gave the impression that at one time it had been a cyst which had completely filled the large cavity of the tumor. Due to the withdrawal of the fluid and the

process of hardening, the cyst apparently collapsed, and its capsule became separated from the wall of the outer cavity. A small piece of this contracted cyst was removed for sectioning; also two pieces were taken from the outer wall of the large cavity behind the eyeball.

The anterior border of the large cavity extended to within about 1.5 cm. of the eyeball which lay above and in front of it. The whole mass was divided into two parts by cutting in a vertical plane about 1 cm. behind the eyeball and parallel to its equator, in order to expose the relation of the retrobulbar and orbital structures. The internal rectus, inferior rectus and superior oblique muscles were missing. The superior and external recti muscles were plainly visible, but both were imbedded in dense tissue, and pushed nearly to the periphery of the mass. The optic nerve was also plainly visible, but was displaced upward from its normal position, lying only 1.5 mm. below the superior rectus muscle. A piece of tissue, including the optic nerve and the superior rectus muscle, was removed for sectioning.

Fig. 5. The collapsed and shrivelled echinococcus cyst, after its removal from the mass of orbital tissues.

Microscopic examinaiton: a. Small section of the cyst itself: The specimen consists chiefly of a narrow pouch of a unilocular cyst with a double chitinous wall. The outer membrane, or ectocyst, is somewhat laminated, while the inner membrane, or endocyst, is practically homogeneous in structure. The tiny nodules which looked macroscopically like hydatid sand, are now revealed as irregular rows of daughter cysts of echinococcus, some attached and others adjacent to the endocyst. These daughter cysts appear to be in various stages of degeneration and disintegration. Several contain either a complete or a nearly complete scolex, but most of them have, within their limiting membrane, quite a number of isolated echinococcus hooklets, some débris, and a few small, densely black, round bodies, which suggest pyknotic nuclei. Some of the daughter cysts have, attached to their inner walls, several granddaughter cysts and degenerated remnants of such cysts (see Plate 3, Figs. 6 and 7).

In addition to the daughter cysts, some attached to the endocyst and some unattached, the pouch of the mother cyst contains a coarsely meshed network of substance somewhat similar in constituency to the endocyst. Within the network there are seen a faintly pink stained coagulum, numbers of free hooklets, débris and cystic rem-

nants in various stages of disintegration. In each section are also found a number of round lime cells, or calcareous bodies, which vary from 20 to 30 μ in diameter. In size they compare with the granddaughter cysts. These bodies are composed chiefly of concentrically arranged calcareous substance. It may be inferred from their size and shape that they represent a stage in the degeneration of some of the granddaughter cysts, or at least of rudimentary skeletons of some sort. Scattered within the meshwork are many small lymphocytes and eosinophiles. Some of the daughter cysts are almost surrounded by a zone of mononuclear eosinophiles, which also are seen in clusters along the endocyst in relatively large numbers (see Plate 3, Figs. 8 and 9).

b. Small specimen taken from the tissue lying between the eyeball and the cyst cavity with a bit of the upper lid: The principal structure of the specimen is connective tissues, showing considerable proliferation of young fibroblasts without any regular arrangement. Adjoining one margin of the specimen there is a cross section of a muscle (superior rectus), with a remnant of Tenon's capsule close by; also a cross section of the optic nerve. The optic nerve fibers are partially atrophic and widely separated by edema. A small number of eosinophiles are seen around the central vessels of the nerve and also in the fibers of the septa separating the nerve bundles. The orbital tissue surrounding the nerve is infiltrated with numerous lymphocytes and eosinophiles. The connective tissue stroma contains a few vessels which are located chiefly near the muscle. There is no definite demarcation between connective tissue and muscle, a condition due chiefly to an infiltration of the connective tissue with many small lymphocytes, epithelioid cells, plasma cells and a few eosinophiles. This infiltration is more marked around the vessels. The walls of both veins and arteries are so much proliferated that the lumina of some of them are entirely obliterated. Here and there in the substance of the muscle, as well as in the adjacent connective tissue, there are many vacuoles which are separated by a very delicate, homogeneous membrane. Several large mononuclears and mast cells are visible in all sections.

c. The anterior segment of the eyeball: The layers of corneal epithelium are increased in number, and the cells are more horny than normal. Their nuclei are only faintly stained. Some of the epithelial cells are vacuolated. Peripherally, for a width of 1 to 3 mm., Bowman's membrane has disappeared, and is replaced by a dense pannus—blood vessels and fibroblasts. The superficial one-sixth to one-fourth of the substantia propria is infiltrated with lymphocytes and plasma cells, among which are seen a small number of epithelioid cells and eosinophiles. The infiltration increases in density toward the periphery of the cornea, and appears to be an extension of even a denser infiltration that exists in the scleral tissue. Descemet's membrane and the endothelial cell layer are normal.

The conjunctival epithelium covering the episcleral tissue shows exposure keratosis—formation of keratin and vacuolization of cells. A large number of plasma cells and eosinophiles infiltrate the subepithelial layers. The scleral stroma in general is loose and shows evidence of edematous separation and atrophy of some of its connective tissue fibers. There is a general infiltration involving the outer third of the sclera; near the limbus this infiltration involves the outer two-thirds. The infiltration is composed chiefly of small lymphocytes and plasma cells, with some eosinophiles and epithelioid cells. The arteries and veins, which are numerous in the region of the limbus, are distended with blood and surrounded by a dense zone of chronic inflammatory cells, among which eosinophiles greatly predominate. The ciliary nerves passing thru the sclera are partially atrophic. The location of the tendinous attachments of the extraocular muscles cannot definitely be determined, owing to the dense cellular infiltration and the probable disintegration of the tendinous structures. In the region of the equator of the globe there are a number of vacuoles arranged in irregular rows in the loose stroma of the outer half of the sclera. These spaces

are larger than those that would be produced by fat globules, and have very thin walls or limiting membranes of homogeneous material. The suprachoroidal space is filled with coagulum, which separates the sclera and the choroid for a distance of nearly a centimeter backward from the anterior end of the choroid.

The anterior chamber is somewhat shallower than normal and the filtration angle is slightly closed by the root of the iris. A number of chromatophores (probably from the iris) are enmeshed in the structure of the pectinate ligament. The iris and ciliary body are practically normal with the exception of the presence of a few eosinophiles. The lens is normal.

d. A piece of the posterior segment of the eye not including the optic nerve: The retinal nuclei take the stain poorly, which probably means beginning degeneration of the retina, which is completely detached (possibly an artefact). The choroid is practically normal with the exception that the vessels, large and small, are engorged with blood. Sclera the same as in "c."

e. The cystic fluid. A few scolices of echinococcus, numerous free hooklets and débris.

Primary Diagnosis: Echinococcus cyst of the orbit.

Secondary Diagnoses: Exposure conjunctivitis; pannus, superficial and deep keratitis and scleritis; maculae of the cornea; chronic inflammation of the extraocular muscles; endarteritis and endophlebitis of the orbital vessels; partial atrophy of the ciliary nerves; chronic retrobulbar neuritis with partial atrophy of the optic nerve; local eosinophilia.

The object of this rather extensive pathologic report is to put on record a fairly complete account of the first case of echinococcus cyst of the orbit reported from China. It should be noted that no vestige of echinococcus was found within the eyeball, altho some of the ocular structures were chronically inflamed, due, no doubt, to the toxins absorbed from the cystic fluid in the adjacent tissues. There is no doubt also that there was some pathologic effect upon the eye and its function, due to the steadily increasing pressure on the globe from behind. The intraocular structures showed signs of this pressure by a beginning atrophy, whereas the denser protective membranes of the eye were affected chiefly by the toxins.

Anyone who has seen a case of echinococcus cyst of the orbit and failed at first to recognize it is not likely to fail again in making an almost immediate diagnosis. A combination of two or three, or of all of the following clinical signs and diagnostic aids would certainly establish a differential diagnosis:

1. The length and character of the history: The combination of sheep and dogs with which a patient has been more or less in contact, in addition to personal habits of uncleanliness, should make one suspicious of echinococcus disease. The duration of fully three years in the development of the cyst as reported in this paper would, generally speaking, be too short for a meningocele, and too long for a tear cyst or a mucus retention cyst. But it could not be differentiated from a malignant tumor on such evidence.

2. The nature of the displacement of the globe: Marked exophthalmos, naturally, always exists. A number of writers state that the eyeballs in their cases were dislocated upward, forward, and inward. In this case the displacement was forward, upward, and outward. In either case a meningocele and a lacrimal cyst would be ruled out.

3. Palpation: The sense of touch should let one know at once that he is not dealing with a solid tumor. Fluctuation, fremitus, and resilience of the mass can easily be elicited if the cyst has attained considerable size.

4. X-ray: The x-ray should rule out any bony changes that one would expect to see in a meningocele, or a malignant tumor with erosion of the walls of the accessory sinuses. Some writers state that the shadow produced on the plate by cystic fluid is denser than that produced by a solid tumor; this seems hard to believe.

5. Urticaria: A history of one or more recent attacks of urticaria should make one suspicious of echinococcus. The steadily increasing pressure from time to time sometimes causes a slight rupture of the surrounding tissues and conse-

quently of the cystic capsule, permitting the escape of echinococcus fluid which infiltrates the tissues and becomes quickly absorbed. The absorption of toxins in the fluid, or of the foreign protein, produces a violent urticaria similar to the serum reaction which often follows injections of tetanus or diphtheria antitoxin. Urticaria has been reported as following exploratory puncture of an echinococcus cyst, when some of the residual fluid seeped into the surrounding tissues thru the wound.

6. A general eosinophilia: A count of more than 2 or 3 per cent of eosinophiles should cause suspicion; yet among the twelve cases of echinococcus cyst of various organs treated at the hospital of the Peking Union Medical College, five showed no pathologic increase in the eosinophilic count, altho three of the five were later relieved of considerable echinococcus fluid. In fact, the one with the lowest eosinophilic count had the most fluid removed. It is significant that out of the twelve, this is the only case that died. Possibly the low eosinophilia indicated a marked loss of resistance in his case. Furthermore, in these five cases it is possible that the cysts were in the stage of retrogression and were becoming sterile, a tendency which exists when the intracystic pressure becomes too high. In the case with the orbital involvement the eosinophilia was only 3 per cent. The average for the twelve cases was 4.7 per cent. Intestinal parasites of any variety will also produce a general eosinophilia, so their absence must first be determined before any reliance favoring the diagnosis of echinococcus can be placed on the existence of an eosinophilia. The data concerning the possible infection of these twelve cases with intestinal parasites are not complete, so too much importance cannot be placed on the eosinophilia in those cases in which it was high.

7. Exploratory puncture: A microscopic examination of the aspirated fluid should establish a diagnosis, for the sediment nearly always contains hooklets, scolices and débris of embryo cysts. A report that the fluid is sterile, as was the case in one of the twelve listed in Table I, may merely mean that none of the sediment was removed with the fluid. To avoid this possibility it is well to shake somewhat vigorously that part of the body containing the cyst just prior to aspiration of the fluid. It is stated that great danger of mixed infection is involved in doing exploratory puncture of echinococcus cysts, so the surgeon should be prepared to operate for complete removal of the cyst immediately after it has been determined by an examination of the fluid that he is dealing with echinococcus disease.

8. Complement fixation test: A positive test using the cystic fluid as the antigen is recognized as establishing a diagnosis. Three of the twelve cases were tested by this method and all of them were strongly positive.

Additional Remarks: One would naturally suppose that involvement of one organ of the body would mean the probable involvement of other organs, but this evidently is not so. According to Simon[2], only one organ is involved as a rule. When multiple infestation exists, it is probably due to successive infestation from without, or possibly to a dissemination of the primary infestation from within, owing to a rupture of the cyst. But a successive infestation would be as much an accident as was the primary one; the individual already infested would probably have no more chance of being additionally infested than other persons associated with him would in becoming primarily infested. However, in a case of echinococcus disease with a history of urticaria, one might logically suspect involvement of other organs or parts of his body. Simon further states that human infestation occurs thru transference of the ova of the adult worms of *Taenia echinococcus* (generally from the dog) to the gastrointestinal tract. Having gained access to the digestive tract, the ovum, or perhaps the oncosphere (larva), freed of its resisting envelope by the digestive juices, penetrates the intestinal wall, and, entering a blood vessel, is carried along in the blood stream until it lodges as an embolus in some other part (generally an organ) of the body where it begins at once to develop a cyst.

According to Barnett[3], once a cyst

begins in a favorable locality, such as in the liver, it absorbs nourishment by imbibition from the surrounding tissues and grows into a bladder like mass, which constitutes the echinococcus or hydatid disease, the rate of growth varying according to the density of the surrounding parts. If the nutrition be cut off, the cyst dies and undergoes degeneration; even calcification may take place. Barnett refers to daughter cysts as embryo cysts which, on account of impaired vitality of the primary or mother cyst, have become detached from the parental wall and float loose in the fluid of the mother cyst. Tertiary or granddaughter cysts may be found free within the secondary or daughter cysts for the same reason. Great-grand-daughter cysts are also occasionally found. Impaired vitality of the primary cyst results from either lack of nutrition or an inability to expand further. In cysts of the liver and the brain there is practically no interference to expansion until vital parts are affected and the patient's death occurs.

In the orbital case herein reported, the vitality of the mother cyst was apparently impaired, since there were many daughter and grand-daughter cysts lying detached from their respective parental membranes. The probable reason for this was the difficulty of further expansion of the cyst, limited as it was by the bony orbit laterally and behind, and by the eyeball, with its muscular and tendinous attachments, in front. Its expansion was further hindered by its location within the muscle cone of the orbit. According to Wood[4], a cyst in this position rather than outside the muscle cone, is exceedingly difficult to be removed without first removing the globe. The large size of the cyst and extensive destruction of the orbital tissues warranted total exenteration in this case.

The ages of the patients reported in this paper, including the one orbital case, make one suspect that the cysts had been developing for many years. The average age was 36 years, the youngest 19, and the oldest 54. The duration of symptoms ranged from one to eight years, with an average of 3.4, but it is almost certain that infestation occurred long before that.

Faust[5] examined the gastrointestinal tracts of about five hundred dogs in China for parasites. In only two dogs, both from near Peking, did he find *Taenia echinococcus*. He states that, to his knowledge, these are the first instances in which these cestodes have been found in dogs in eastern Asia. The evidence produced by this paper implies that a number of dogs in Peking and its environs are thus infected and that they are the source of the larval infestation of man in this same area. Of the twelve cases herein reported, eleven, including the orbital case, were natives as well as residents of Chihli, the province in which Peking is located. All of these eleven cases were males. The one female case was a Chinese woman, age 19, who had lived all her life in Mongolia. If, as shown by this paper, the disease exists sporadically in North China where the conditions for its dissemination are not good, it would not be amiss to suggest that, in Mongolia where the conditions are as ideal for its dissemination, as they are in Australia or Iceland, echinococcus cyst in man ought not to be uncommon.

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DIFFERENTIAL DIAGNOSIS BETWEEN CONJUNCTIVITIS NECROTICANS INFECTIOSA AND CONJUNCTIVITIS TULARENSIS.

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Necrotic infectious conjunctivitis and the conjunctivitis of tularemia are similar in some respects. Pascheff, the discoverer of the former, compares them as to bacteriology, pathogenicity, ocular and general symptoms, pathological anatomy and treatment. He concludes they are distinct diseases, produced by different bacteria.

In determining the differential diagnosis between conjunctivitis necroticans infectiosa and Parinaud's disease[3], I spoke against the unity of Parinaud's disease and of the necessity of creating a common syndrome, which I called syndrome of Parinaud, under which

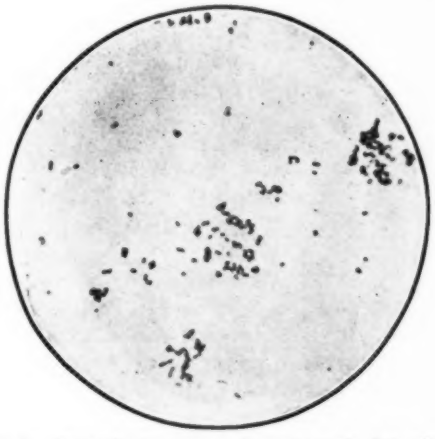

Fig. 1. Bacteria in culture from necrotic infectious conjunctivitis.

Fig. 2. Appearance of eye with infectious necrotic conjunctivitis.

many similar diseases can be brought together, having, however, varied etiology. The syndrome of Parinaud consists of three principal symptoms; infectious lesions in the conjunctiva, swelling of the corresponding lymphatic glands and rise of temperature. This opinion of mine was adopted also by Beauvieux[1], in France, and by Passenard[4], of Toulouse.

My further object was to point out a criterion, which can differentiate conjunctivitis necroticans infectiosa from all other diseases, which were and are still published under the name of Parinaud's disease. This criterion I found in discovering the agent of conjunctivitis necroticans infectiosa, with which I could reproduce the disease in the spleen of some rodents, especially the guinea pig. My communication in England has reached also America. Dr. H. H. Stark[6] of Texas, reporting four cases of conjunctivitis necroticans infectiosa (Pascheff) says "all these cases were of the same clinical character and I believe due to the same cause. They correspond in appearance and course to those reported by Pascheff; and it is hoped that some time in the future another may present itself, when further investigations will be carried out." His attention was drawn to this disease after having treated his fourth case.

At the same time many publications in the United States have been made on a peculiar disease, which has been observed thruout the country, most especially by Dr. Francis[2] of Washington. According to this author the disease, caused by the B. Tularensis, is an infection of the blood. He calls

it Tularemia; the conjunctivitis which it causes is called conjunctivitis tularensis (Vail[7]).

In answering the request of the A. J. O. I shall try to contrast the features of conjunctivitis necroticans infectiosa and conjunctivitis tularensis, to see whether they are identical diseases or different. I shall compare them from several points of view, bacteriologically, symptomatologically and pathologically.

Fig. 3. Section of conjunctiva from necrotic infectious conjunctivitis; a and b spots of infiltration.

Bacteriology and Pathogenicity.

Conjunctivitis Necroticans Infectiosa.

The agent of this disease is Micrococcobacillus polymorphus necroticans.

It has been isolated from the inoculated guinea pig. Its morphologic and cultural characters are the following: Size between 0.25 and 2 Micr. in culture. Shape that of a small coccus but sometimes of a bacillus. It possesses neither cilia nor capsule. Even in the smear from the spleen of the inoculated guinea pig scarified on the fourth day I found numerous small grain like cocci without capsule.

The agent is aerobic and anaerobic. It does not grow at ordinary room temperature. It does not liquefy Loeffler's serum, or gelatin, and forms no crust. It causes turbidity in bouillon, coagulates milk and gives an acid reaction. It does not form spores. It grows on the surface of agar without any color and forms no gas. It is not motile. Cultures must be renewed every seven to eight days. The best medium is ascitic agar.

Biologic reaction: Bordet et Gengou is positive with antigen 0.02 and serum 0.20.

Agglutination with patient's serum

Conjunctivitis Tularensis, Tularemia.

The agent of this disease is B. Tularensis.

Prof. Wherry and Lamb[8], who have isolated the bacillus in Dr. Vail's case, say: "It is a minute rod surrounded by a considerable amount of capsular substance when in the tissues of infected animals. In our experience the rod shape is only to be seen when an animal is chloroformed before death. Postmortem the organism soon rounds up into coccoid bodies; and this latter form is the only one we have seen in coagulated egg yolk, or yolk over mucoid cultures. No distinct capsule is to be seen in cultures.

When measured under a Zeiss 3 mm. N.A. 140, the coccoid form from egg-yolk cultures measures about 0.5-0.6 micron in diameter. The rods, including the capsular halo, measured about 1 to 1.5 microns by 0.7 microns.

The discoverers of the B. Tularensis, McCoy and Chapin, give the following approximate measurements: "Length 0.3 to 0.7 micron; length of capsule 0.4 to 1. micron; breadth 0.2 micron; breadth of capsule 0.3 to 0.5 micron."

They also note that coccoid forms occur in the tissues and that irregular

1:2000 (1 observation) and 1:200 (3 observation).

PATHOGENICITY. The experimental results reveal the virulent character of the agent. The best animal for these experiments I have found to be the guinea-pig. I have tried many experiments which can be summed up to:

(a) Inoculation from man to guinea pig.

(b) Inoculation from guinea pig to guinea pig.

(c) Inoculation of the guinea pig with the bacillus. They were done in the eye, peritoneally, but mostly subcutaneously and terminated in death; and globular forms predominate in cultures.

B. Tularensis is stained the best with anilin water, Hoffman's violet or Victoria blue. It grows only on coagulated hen's egg yolk or serum glucose cystin agar, as a small nonmotile Gram negative rod. The blood serum of a patient suffering from Tularemia agglutinates B. Tularensis. The culture is viscous. The subculture in the same medium gave the same coccoid form.

ANIMAL INOCULATION. The guinea pigs succumbed on the fourth or fifth day after cutaneous inoculation, with

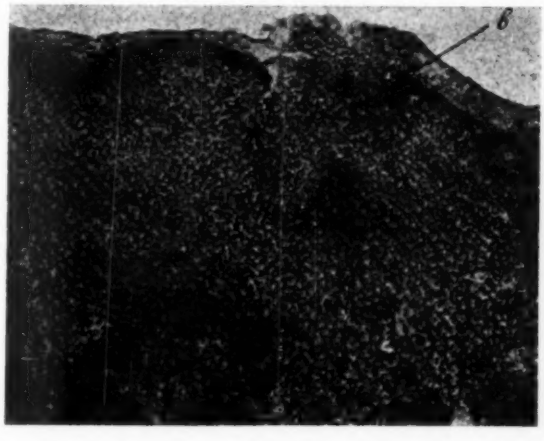

Fig. 4. Section thru point of infiltration, b. Necrotic conjunctivitis.

which happened always between 6 and 16 days, but generally between 6 and 8 days after the inoculation.

The agent was kept for one year living in subculture.

The most striking features of the disease are the changes in the spleen. On the surface they appear as white spots and dots (Fig. 6). In the interior of the spleen they appear as small necrotic grains.

The white spots can be seen also in the liver and the lungs but less developed. Sometimes they appear as big white patches of necrosis. There is also a glandular hypertrophy. The inoculation from the glands of inoculated animals gave the same results, but from the suppurating glands of man gave no results.

spleen juice, or when pricked in the eye with an infected needle.

The autopsy showed: The glands are swollen but not caseous on section. The liver and spleen are swollen and speckled with numerous yellowish white foci of necrosis.

The rabbit inoculated in the eye dies the sixth day with a number of yellowish-white areas of necrosis in the conjunctiva, spleen and liver. An infected emulsion was dropped in the healthy eye of a guinea pig. It died in four days time. The conjunctiva presented the same round ulcers and the lymphatic glands in the neck were markedly involved.

At the incision of the glands in man I found pus and granulation but no caseation. The inoculated rabbit in our Case II died on the 21st day with numerous white spots in the spleen, and some in the liver and lungs.

Symptomalogy and Evolution.

Local Ocular Symptoms.

Conjunctivitis Necroticans Infectiosa (Pascheff).

The eyelids of the affected eye are red and swollen. In the inferior conjunctival fornix there are numerous small white spots and dots the size of a millet seed, not sharply defined but merging into the surrounding red conjunctiva. Some are slightly elevated, others excavated (Fig. 2) and ulcerated phlyctenules. On the surface of the elevated spots there is a fine vascular network. These dots and spots are to be found in the upper fornix also, but without any vegetations. They do not resemble ordinary follicles or trachoma granules; but, as Gunther remarks about his case, give rather the impression of superficial necrotic foci, such as I have previously described. Another characteristic of these spots

Conjunctivitis Tularensis (Vail).

Acute and violent inflammation of one eye with the aspect of gonorrheal ophthalmia. The eyelids are red and swollen, the secretion is abundant and mucowatery.

The palpebral conjunctiva, on eversion, is riddled with abundant discrete, deep, round, yellow, necrotic ulcers; that run clear thru the substantia propria of the conjunctiva, quite to the tarsus. There are six such round ulcers over the upper tarsus and four at least over the lower tarsus. The ulcers appear punched out but filled with golden yellow necrotic plugs. Sizes vary from 6 mm. the largest, to about 1 mm.

The surrounding conjunctiva is deep red, very soggy and swollen, but does not bleed on being wiped with wet

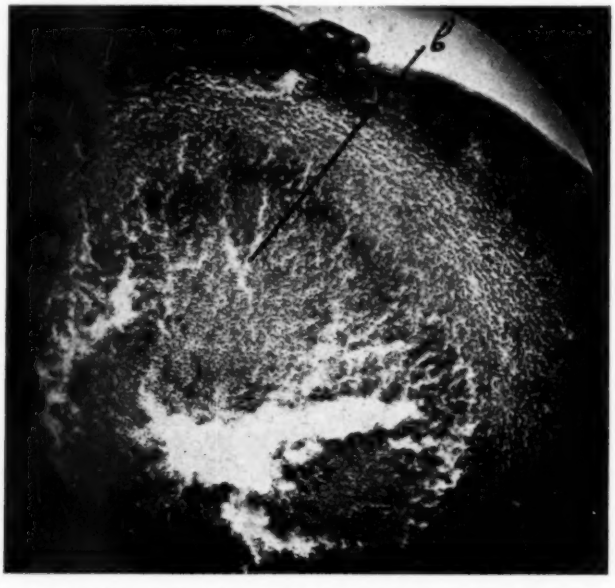

Fig. 5. Nodular infiltration with the central necrosis. No caseation. b.

is that after ulceration they clean and cicatrize while similar fresh spots appear in other parts of the conjunctiva. In only one case, I observed in the lower fornix a deep round yellow focus forming a small abscess (Fig. 2 C).

The inflammation is acute. The spots disappear in from two to three weeks. The glandular affection may last from two to three months. The evolution of the white spots passes thru three stages: 1. Period of infiltration. 2. Period of ulceration or suppuration, during which the ulcers on the surface and the abscesses in the deeper parts are formed. 3. Period of cicatrization, leaving hardly any visible traces.

B. General Symptoms.

As general symptoms we observed fever, swelling of the corresponding lymphatic glands and some general weakness, but no constitutional prostration. We can say that in conjunctivitis necroticans infectiosa the most serious general symptom is the swelling of the corresponding glands. So that we have never observed a typhoid form, but always a glandular form.

The highest fever observed was 38.2° C. It lasted generally a very short time. Examination of the blood in the first patient gave:

Number of red cells.....	4,100,000
Number of white cells	4,160
Hemoglobin	70%
Polynuclear leucocytes	60%
Small lymphocytes	27%
Cells of Ehrlich	9%
Cells of Türk	4%

The examination of the blood of the second patient gave:

Polynuclear leucocytes	47%
Small and big lymphoc.	43%
Leucocytes, basophiles	1%
Eosinophiles	2%

The patients were coming as outpatients. Only for the incision of the glands was one taken in the hospital.

Dr. Francis distinguishes two clinical forms of tularemia: Glandular type and typhoid type. In the glandular type the patients were mostly infected thru the skin; they were fly bitten, tick bitten, or had cut up jackrabbits or dressed cottontail rabbits. In the typhoid type the infection came generally among laboratory workers and the patients were free from enlarged glands.

As general symptoms, besides the unilateral corresponding swelling and suppuration of the glands, there was:

C. Fever which lasts two to three weeks, and many reach a height of 104° F. On account of this fever the disease is also known as "deerfly fever," "rabbit fever," and "tick fever," all due to B. Tularensis (Francis). General constitutional depression and sometimes death.

D. Slow convalescence. It is rare for a patient to be at work again at the end of a month. Usually the second month is spent lying about the house owing to weakness on exertion, and during the third month only half time work is performed.

The Pathologic Anatomy.

Conj. Necroticans infectiosa.

The white dots and spots in the conjunctiva show a dense infiltration of the conjunctiva which forms a focus of cotton. The necrotic plugs in the beds of the ulcers cannot be wiped away. The contrast between the deep red color of the conjunctiva and the brilliant golden color of the ulcers is as striking as a turkey-red calico dress with yellow polka dots. Prof. Wherry and Lamb became acquainted with the work of McCoy and Chapin; and, by using the coagulated egg yolk to grow B. Tularense, they isolated what they believed to be the same bacterium. Eye cases were seen by Drs. Sattler and Lamb and later by Dr. Pfunder[5].

Conjunctivitis Tularensis.

No histologic research has been done by Dr. Vail. Speaking of the conjunctival ulcers, he says that they perforate

exudation consisting of: 1. Polynuclear leucocytes. 2. Tissue cells in proliferation. 3. Peripheral zone of lymphocytes. In the center necrosis rapidly develops (Figs. 3 and 4).

The infiltration is nodular; when superficial it ulcerates quickly; if it is deep in the tissue it develops into an abscess. The presence of many polynuclear leucocytes indicates the suppurating tendency of the disease with the rapidly formed central necrosis (Fig. 5). No caseation in the glands.

The lesions in the experimental infections with micrococcobacillus polymorphus necroticans are small grains scattered especially in the spleen, but also they may be found in the liver. Histologically they are small necrotic areas; the smallest have a diameter of 1/5 mm. (Fig. 7).

In the spleen they are surrounded by a hyaline zone and in the liver the tissue around them is a proliferation containing many polynuclear leucocytes. On the surface of the spleen the dots are bigger and contain more polynuclear leucocytes, blood and endothelial cells.

the conjunctiva quite to the tarsus. Evidently the solitary lymph nodes of the conjunctiva are the seat of the necrosis.

As for the swollen glands in animals, Prof. Wherry says "that they are not caseous on section"; while Dr. Francis says "that the inoculated animals die, presenting the most pronounced caseation of the enlarged lymph glands."

The lesions in the experimental infections with the bacterium tularensis, according to Wooley[9], are essentially areas of necrosis with no suppuration, except in the case of the skin. There is no evidence of any marked proliferation of the endothelial cells, as is true in plague and typhoid. In the smallest lesion in the liver, where the process is limited and clearest, the earliest change seems to be degeneration of the liver and endothelial cells with very early karyorrhexis. In this type there are a few lymphocytes present, but no polymorphonuclear leucocytes. The latter move to the region of the lesions following the degeneration of the cells; and never occur within the lesions in large number as in plague where, according to Ledingham, the lesions are essentially focal necroses to start with, but may become abscesses.

The Treatment.

It is a mere disinfection, the infiltrations when superficial ulcerate and disappear of themselves. When fluctuation appears in the glands they must be incised.

The treatment is symptomatic. Rest in bed is most important. Incision is advised only for fluctuation.

Conclusions.

From all above said we see that conjunctivitis tularensis resembles conjunctivitis necroticans infectiosa in some points and differs in others. The common features in both diseases are: 1. The white dots of the conjunctiva; 2. The virulence of the disease for rodents; 3. The reproduction of the white spots and dots in the spleen of the animals.

But there are also differences. Dr. Francis of Washington, who has studied much tularemia in the United States, in a letter to Dr. Vail, who asks him his opinion in regard to my disease, says: "Pascheff was not dealing with Tularemia. The similarity between Pascheff's disease and tularemia is of course apparent, but I wish to call attention to the difference under the following headings."

1. Guinea pigs. In tularemia you get in guinea pigs and rabbits not only focal areas of necrosis in the spleen, but equally striking are the focal areas of necrosis in the liver, and there is most pronounced caseation of lymph glands.

2. Cultures. Pascheff's organism grew not only aerobically, but anaerobically; it grew on plain agar, on gelatin, on Loeffler's serum in milk and in

bouillon. Bacterium tularense will not grow on the mediums enumerated.

3. Agglutination. The serum of patient I agglutinated this organism in dilution of 1:2000; the serum of patient II agglutinated it in dilution of 1:200; Pascheff concludes that the organism isolated was the cause of the disease and that its agglutination was due to the agglutins in the patient's serum, and I agree with him. Therefore, the patient could not have had tularemia, for in that case his serum would have agglutinated only bacterium tularense and would not have agglutinated the organism which he isolated and which differs sharply from bacterium tularense in that it grew on ordinary media.

On the other side he has demonstrated the B. Tularense and its lesions, and says: "The representatives of England, France, Germany, Italy, Spain, Hungary, Czechoslovakia, Poland, China, Japan, India, Australia, Canada, Mexico, Brazil, Argentine and Ecuador have been shown the pathology and bacteriology, both in microscopic preparation and on the autopsy table, and with one exception (Japan) all said that they never encountered anything like it at home."

Further on we say that there is also a morphologic difference between the two organisms. The B. Tularensis has a capsule, while the micrococcobacillus polymorphus necroticans has none.

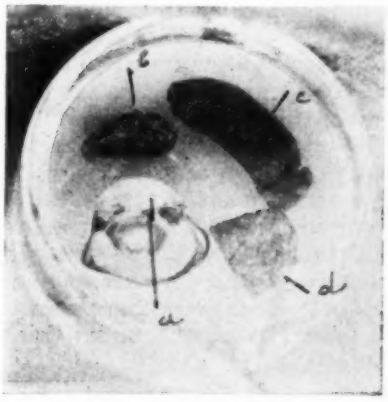

Fig. 6. Lesions in spleen.

The pathogenicity seems to be greater by B. Tularense especially for rabbits.

The general symptoms caused by it are more serious and the fever lasts longer. Still more, B. tularensis causes not only a disease of the conjunctiva, but also of the skin, and has also its typhoid form; while micrococcobacillus

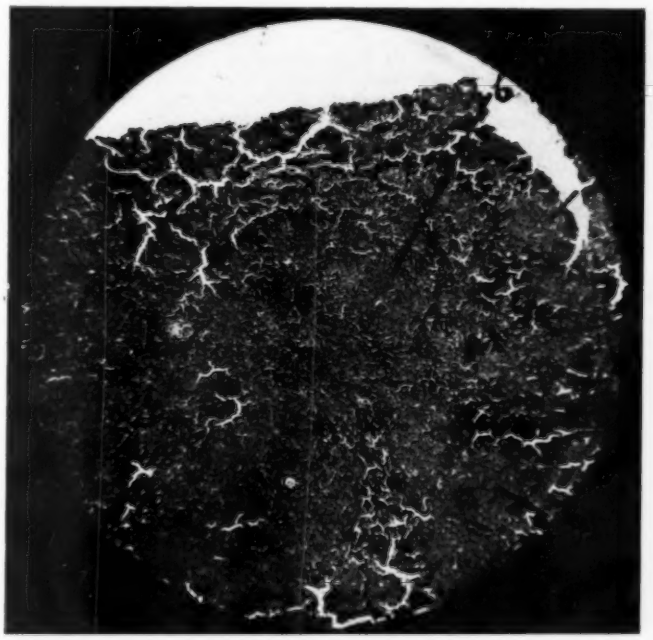

Fig. 7. Small necrotic area in the liver.

polymorphus necroticans has been observed only on the conjunctiva. In the inoculated animals it causes lesions in the spleen, the liver, and even the kidneys are congested; but the chief and most typical lesions are the dots and spots in the spleen. In the conjunctiva it causes two kinds of lesions: the superficial and phlyctenular ulcers and the profound grainlike abscesses.

Conjunctivitis necroticans infectiosa is a nodular infectious disease, with tendency to suppuration, while conjuntivitis tularensis gives caseation in the lymph glands. Lastly, the white dots of the first are spread everywhere, but mostly in the fornices, while the white dots of the second are said to be found generally on the tarsal conjunctiva.

In conclusion we see that after a special infection of the conjunctiva two similar diseases of the conjunctiva can be provoked: conjunctivitis necroticans infectiosa and conjunctivitis tularensis. Both of them show white dots and spots in the conjunctiva and in both of them the dots can be experimentally reproduced in animals. The first disease I discovered in Europe (Bulgaria) in 1914; the second was discovered by Wherry and Lamb and Vail in America in 1914. In spite of this similarity, however, besides the histologic changes which were not studied in conjunctivitis tularensis we saw that these two similar diseases are caused by different agents, but both virulent for the rodents.

In this way we see not only that conjunctivitis necroticans infectiosa must be quite separated from Parinaud's disease, but also that there is another disease similar to it, the conjunctivitis tularensis. The first is caused by micrococcobacillus polymorphus necroticans, the second by B. tularensis. They are both gram negative, both virulent to rodents, both causing white necrotic dots and spots in the spleen of the inoculated animals, but they differ as we saw morphologically and culturally, as well as pathogenically. This difference, however, waits to be proved also by the biologic reaction of Bordet-Gengou.

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STEEL IN THE VITREOUS. CASE REPORT WITH NOTES.

H. L. UNDERWOOD, M.D.

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A small fragment of steel situated almost on the retina was not drawn forward by the giant magnet in front of the cornea. Later iris scissors applied to the magnet and introduced thru a scleral incision and repeatedly snipped brought away the particle. The track thru the lens cleared and standard vision was regained.

The case here reported is noteworthy in that the giant magnet was employed with steel scissors introduced into the vitreous. Usually the hand magnet so used suffices. Further, complete perforation of the lens without traumatic cataract formation as a sequence is somewhat unusual. The minute size of the particle concerned and its position loosely on the retina near the posterior pole involves certain considerations.

Case Report: Mr. B., age 19. Lumber mill worker. On Feb. 17, 1926, while using a chisel and mallet to cut a link in a steel chain, he felt something strike the left eye. No marked discomfort followed and he did not quit work until the 18th.

He was first seen by me on that date, when a mild ciliary congestion was evident. There was slight photophobia but no pain. Examination showed a slight wound of entrance in the cornea, and the free border of the iris at the nasal side presented a small triangular nick, and intraocular examination showed a complete perforation of the lens. The media were clear but no foreign body was seen, other than a tiny particle of some sort in the lens channel. The giant magnet was applied over the center of the cornea for about forty-five minutes; after which a minute particle of magnetic character was found on the sterile towel in the field of operation. As the magnet tips had been repeatedly changed I felt dissatisfied to consider this as the object of search, but postponed further effort for thirty-six hours. Meanwhile, on second examination, I discovered a flattened piece of metal lying free at the back of the globe close to the retina, to which it seemed to be connected by a delicate film of whitish exudate. It lay about two disc diameters to the nasal side of the nerve-head slightly above the horizontal meridian. The tiny opacity in the tunneled lens had disappeared.

An X-ray localization was done by Dr. Butler. Position as determined by him was as follows: 19 millimeters posterior to apex of the cornea and 8½ millimeters above center and to the nasal side.

Feb. 20 a second attempt was made with the giant magnet, applied to a scleral incision one centimeter from the nasal margin of the cornea. A half hour's application to the scleral opening gave no result, and resort was made to slender, angled iris scissors, with long tapered blades, attached to the giant magnet, which was of the suspended type. The patient occupied the prone position. Anesthesia was with cocain instillation and novacain and adrenalin subconjunctivally. Morphin one-fourth grain hypodermically preceded the operation. Using both hands to control the position of the magnet, it was lowered by an assistant until with a little pivoting, the scissors, closed, entered the posterior chamber in the general direction of the foreign body. After some moments it was removed. During the second insertion the free blade of the scissors was opened and closed while traversing the vitreous. This was repeated two or three times before the steel was found adhering to the scissors tip.

A stitch in the conjunctiva closed the wound and the patient was put to bed. Uninterrupted recovery followed. Vision two weeks after operation was 20/20 with a plus .37 cyl. ax 90°, and eight months later, 20/20 both eyes without correction. The nick in the iris still present. The tunnel thru the lens had disappeared. Media normal in appearance.

The steel weighed g. .0008 as determined by Dr. Haskins of the University of Oregon Medical School.

In considering this case one should first of all mention the superb behavior of the patient under prolonged and repeated manipulation, with so cumbersome an appliance, used intraocularly.

The question as to which magnet to use, and whether to use it intraocularly or not, is a moot point to be settled as much by the experience of the operator as by the conditions present. However the conditions present, including the personality of the patient, are commonly the determining factors. Excluding the latter, these relate especially to location and size of the foreign body and the structure and importance of tissues thru which it must be drawn.

Location: In the anterior chamber either the intraocular method with the small magnet, or the extraocular method with the giant magnet should be readily successful, even with minute particles. Steel in the vitreous presents a more difficult problem, in which intraocular operation should be tried only after the failure of either or both magnets applied to a scleral opening. Steel embedded in the sclera at the posterior pole is generally not removed by any method which does not hopelessly ruin the sight.

Size: In the anterior chamber, size does not matter particularly except for the greater danger of injury to the iris by large steel fragments. In the posterior chamber, the smaller the particle the more difficult its removal, but the less traumatism in its passage, and therefore the best prognosis. These considerations are in part graphically emphasized by the formula expressing Coulomb's law. According to Coulomb's law the force exerted between two magnetic poles is proportional to the product of the strength of the poles, and inversely proportional to the square of the distance between them. Thus taking F as the force exerted between the poles, m the strength of one pole, m′ that of the other, d the distance between them, and u the magnetic permeability of the space between the poles; then,—

$$F = \frac{m\ m'}{u\ d^2}$$

For practical purposes, in this case u may be omitted.

Evidently it is important for both m and m′ to be in appreciable amount, if F is to be of effective magnitude. How small may m′ be? In other words how small a particle of steel can be successfully removed from deep in the vitreous by use of magnets of manageable size? Professor Haab has stated that gm. .001 is the minimum in his large experience (375 cases). It should be noted that he nearly always uses the giant magnet applied to the center of the cornea. Rollet in a series of 220 cases of magnet extraction reports some weighing as little as .2 or .3 mg. Whether these were vitreous cases or not, I do not know.

Structure: The texture and density of the media thru which the steel must be drawn is a factor of great importance, not covered by Coulomb's Law. The highly viscid contents of the posterior chamber adds greatly to the difficulty of magnet extraction in that portion of the globe. But in addition to that, is to be considered the reticular structure, which acts like the meshes of an elastic net wherein a modicum of progress is neutralized by a spring like recoil, on cessation of the current. Hence the use of slender scissors applied to the magnet, and used as scissors and not merely as an extension of the magnet tip within the eye, has the advantage that it severs the elastic fibers in the path thru the vitreous.

This method of using the scissors was developed and emphasized by Jackson. I can highly recommend it from my own experience. We are too apt to regard the vitreous as a homogeneous liquid, whereas it is a tissue.

Finally, it is a fair question to ask: Might not a particle less than g. .001 in weight be harmless within the globe? If it were embedded in the lens or even in the ciliary body, one might well adopt expectant treatment, if the patient can be under observation from time to time. Where the steel is in close relation to the retina, any particle large enough to be perceptible is probably a serious menace. In the case here reported the filmy exudate, already evident three days after the injury, connecting the steel with the retina adjacent, would so indicate.

311 U. S. Nat'l Bank Bldg.

CLINICAL AND EXPERIMENTAL OBSERVATION ON FOREIGN PROTEIN ESPECIALLY IN IRITIS.

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Foreign protein therapy has been used since 1904. The horse serum used seemed to be the important element. Animal experiments have been inconclusive; but clinical trials of protein therapy have been more positive as to its good effects.

Considering the different methods of ocular therapy, that of foreign protein has probably called forth more varied opinions than any other. Some of these have been favorable, altogether too favorable, while others have been to the contrary. Ever since the theory of opsonins and the opsonic index of phagocytic activity was proposed, investigators have been attempting to standardize bacteria and their various strains, and to regulate their virulence, as the case required, in order to use them for diagnostic, prophylactic, and curative purposes.

Foreign protein or paraspecific therapy is by no means new. It probably owes its origin to the older specific therapy, for example, that of diphtheria and tetanus. As early as 1904, Darier noting the marvelous results of diphtheria antitoxin in diphtheria, experimented with it in conditions other than those due to the Klebs-Loeffler bacillus. Later, he tried the serums of Roux and Behring. About the same time, still in 1904, Roemer used autoserum obtained by raising a blister in the scapular region, drawing off the serum, and injecting it under the conjunctiva, under the skin, or intravenously. In 1907, Deutschmann advocated the use of yeast serums. A little later, milk was suggested by European writers, especially the German. Then came horse serum, Coley's fluid, albumoses, proteoses; and recently typhoid vaccine, old tuberculin and various substitutes for milk have been recommended.

Since the beginning there have been those who have opposed this mode of treatment, among whom have been Axenfeld, Happe, and von Szily. They base their opposition on the ground that experiments on animals do not satisfy bacterial qualifications, in that the same lesions in man cannot be reproduced and treated in animals with similar success. Also they believe that the tissues of the human body react only to specific injections. Further, they say that the opsonic index is not altered, and there is no increase in the agglutination or complement fixation.

But, as Darier says, why should a method which has been so successful clinically be swept aside merely because it has failed in animal experimentation. Foreign protein of some nature has been used in almost every form of ocular infection. It has been employed in abscess of the lid, phlegmon of the orbit, acute conjunctivitis, gonorrheal conjunctivitis, trachoma, lacrimal gland and sac abscesses, keratitis, both ulcerative and nonulcerative, with and without hypopyon, iritis, uveitis, choroiditis, panophthalmitis, optic neuritis, and penetrating wounds of the eyeball. Judging from this formidable list, one might take foreign protein to be a cureall for ocular infections, but such is not true. The results may not be so favorable in patients with too overwhelming an infection, or with other complications. This should not, however, be a contraindication for its use, as some remarkable ends have been attained in seemingly hopeless cases.

In using diphtheria antitoxin, we feel it is better to designate the dosage in c.c. of horse serum, rather than in units of antitoxin as is sometimes done, in as much as the effective element is almost surely horse serum. A sufficient dose is 3 c.c. of the serum given intramuscularly. The plain horse serum is preferred by some, since they feel that it is the activating principle in diphtheria antitoxin. Care should be taken in giving either of the serums to asthmatics and hay fever patients, or to those having had diphtheria or previous injections, because of a possible anaphylactic shock. However, it may

be safely repeated if the patient is carefully tested for sensitivity and then desensitized if necessary. Hives is a complication which frequently occurs with the above foreign proteins.

Milk in 10 c.c. doses is favored by some European writers, but is not so popular in this country, because it varies in its contents, namely, bacteria, fats, carbohydrates, salts, proteins, water, etc. The fact that so many substitutes for milk have been exploited would seem to indicate that the latter was not entirely satisfactory. Aolan, chief among these, has been widely advocated, but in our hands has proven inadequate.

Typhoid vaccine has been highly recommended by Wilder and Allen in doses of thirty to one hundred million, repeated if necessary in the smaller dosage. They prefer this foreign protein because it can be easily obtained, and the dose readily controlled.

Following the injection of a foreign protein there is usually a reaction, which may be slight or pronounced, consisting of a chill, a rise in temperature, gastrointestinal symptoms, pain in the joints and bones, erythema and general malaise. Most investigators prefer at least a moderate reaction, especially the rise in temperature, as they feel the latter favorably influences the lesion.

There are many theories concerning the mode of action of foreign protein, chief among which are (1) that all the cells of the body, such as the nervous, muscular, glandular and osseous, are stimulated to produce antibodies which will combat the invading infection and thus place the body in a state of defense, both locally and generally. (2) Combined with this may be a reduction in the virulence of the infection. (3) Some believe there is an increased permeability of the capillaries, producing a lymphogogic action.

Jobling says whatever substance is used, the underlying principle is the same. There may be a production and mobilization of specific antibodies, or there may be nonspecific antibodies. Then, too, the hyperpyrexia may exert a beneficial influence, as it is well known that a high temperature, artificially produced, acts favorably on an established infection. Peterson and Jobling also offer a chemical basis for the solution of the problem. They say that it has been proven that animals injected intravenously with bacteria and other foreign substance, show a mobilization of serum protease, which is without effect on the infecting bacteria generally, but does cause a detoxication of their products.

Longcope views the question from the standpoint of sensitization and anaphylaxis. He defines the latter as a reaction to a high degree of hypersensitiveness, and says that any substance, such as foreign protein, which reduces the hypersensitiveness prevents anaphylaxis. Marin Amat thinks foreign protein acts thru its influence on the spinal sympathetic nervous system, and by stimulating the production of proteolytic ferments.

EXPERIMENTS

Experimenting on thirty-five rabbits at the laboratory of the Bryn Mawr Hospital, Dr. Belk and I were unable to come to any conclusion as to the benefit of foreign protein in ocular infections in animals, which would parallel our definite success in humans. The reason for this was that the infected eye in all but three cases either went on to rapid destruction or healed spontaneously with a resulting scar.

In the first series of seventeen rabbits, fifteen were inoculated in the anterior chamber with a suspension of type III pneumococcus of a stock culture, while two were inoculated with a suspension of a staphylococcus aureus, obtained from a case of conjunctivitis. Four of the former were used as controls and the remaining thirteen were treated with Coley's fluid. One rabbit had been previously immunized against bacillus typhosus. After a mild course this animal quickly recovered, leaving only a small corneal scar as a result. In the second series, one cornea each of eighteen rabbits was inoculated with a saline suspension of staphylococcus aureus. Eleven were treated with diphtheria antitoxin, while seven were used as controls

Thruout the experiments, one especially interesting fact appeared, namely that immediately after the injection of the foreign protein, for from ten to eighteen hours, the resistance of some of the animals seemed to diminish, during which period the infection appeared to progress more rapidly than in the controls. Then if the animal had not been overwhelmed by too virulent an infection, recovery ensued, leaving in most cases a corneal leucoma. In no case did the foreign protein seem to improve the condition of the animal. Our animal experience corresponded to that of other investigators, with the exception of Key, who has been able to produce corneal lesions, and obtain favorable results with diphtheria antitoxin injections.

CLINICAL OBSERVATIONS

Clinically, our experience for the most part, was satisfactory, especially in iritis. In all, thirteen cases were treated with either diphtheria antitoxin, horse serum or aolin. Of these, ten were iritis, one uveitis, one phlyctenular keratitis and one corneal ulcer. Six of those with iritis were treated with diphtheria antitoxin, two with horse serum and two with aolin, a derivative of milk. Of the remaining three cases, two were given diphtheria antitoxin and one horse serum.

One case of iritis was complicated by a hyphema extending to the middle of the pupil. This disappeared in about one week. He also had badly infected teeth, which prolonged his illness, but after the removal of these, his condition rapidly improved. The pain was relieved in about six hours, while the other symptoms were ameliorated in twenty-four hours. Another case of iritis had an acute prostatitis, and altho it reacted favorably to diphtheria antitoxin, did not recover entirely until the prostatitis had been thoroly treated and cured. Still a third case of iritis, seen seven days after the onset of symptoms, showed a hypopyon. The latter disappeared in forty-eight hours after the injection of horse serum and the eye became quiet within ten days, only to suffer a relapse two weeks later, due to a mouth filled with badly infected teeth and pyorrhea.

The case of uveitis did not respond at all to any injection of diphtheria antitoxin, altho eight were given. The patient gave a history of tuberculosis, and had an active patch of choroiditis. The Wassermann reaction was negative. The corneal ulcer case was also tubercular, and previous to the development of the ulcer, had attacks of phlyctenular keratitis, extending over a period of two months. After two doses of horse serum the ulcer healed and the eye became quiet, but a relapse occurred as soon as the patient left the hospital. In all our cases the period intervening between the onset of symptoms and the first observation, averaged six and a half days, being sufficient time to allow the infection to become well established.

There was marked *reaction* in four patients, all of which reported feeling feverish and having developed hives, with gastrointestinal symptoms. The reaction was mild in six cases, and absent in three. The severest reaction, also the quickest results, were present in those having horse serum. The next most severe reaction followed injections of diphtheria antitoxin, while there was no reaction with the use of aolin, and the results were least satisfactory.

The most striking feature about the use of foreign protein was the almost immediate *relief from pain,* especially in cases of iritis. One patient said that within one hour after an injection of a dose of diphtheria antitoxin the pain disappeared. The average duration of the pain after an injection was nine and ten hours, while the ciliary injection disappeared in five days, and lacrimation and photophobia did not last over two days.

In the uncomplicated cases of iritis the convalescing period averaged fourteen and one-half days, from the date of the first injection of foreign protein, while in the remaining cases, excepting the case of uveitis, the average convalescence lasted twenty-three days.

CONCLUSIONS

1. Foreign protein is a valuable adjunct in the treatment of ocular infections, but should never be used to the exclusion of the regular routine methods.

2. In our cases, especially those of iritis, we felt the convalescing period was materially shortened, and the severity of the symptoms markedly lessened.

3. Of the foreign proteins used, horse serum gave the most marked reaction, and also the quickest relief from symptoms.

4. In cases complicated by focal infections, the latter should be eradicated before any permanent result may be anticipated from the use of foreign protein.

5. It was of no avail in one case of uveitis.

6. In our experiments on rabbits' eyes, we were unable to detect any beneficial effects from injections of foreign protein.

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NONOPERATIVE TREATMENT OF DACRYOCYSTITIS.

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Medication by solutions applied with a syringe, especially mercurochrome, followed by albolene, warm compresses, the use of small probes, rest and general remedies, obviate the need for operation in many cases. Care, precision, avoidance irritation and careful patient treatment are needed.

The nasolacrimal apparatus, consisting of the punctum, canaliculus, sac and nasolacrimal duct, has probably been more maltreated thru crude and rough instrumentation than most any other organ in the human body. It is a very delicate organ and should be treated with great care and precision. It is lined with mucous membrane, which is extremely easily injured and scarred by instruments and irritating medication, hence perfection of technic and precaution in the application of drugs cannot be too strongly urged. Another necessary factor, that aids greatly in the treatment of affections of the lacrimal apparatus is patience, both on the part of the physician and the one under his care. Many cases require weeks or even months of careful and patient treatment. A lack of this has been the cause of a needless sacrifice of many sacs. Too often surgery is the easiest way out and the sac is removed.

It is not presumed that surgery is never indicated. There are many instances in which surgical interference is the only procedure, as in phlegmonous, fistulous and similar conditions which are not due to some specific affection like tuberculosis or lues. In these cases definite nonsurgical procedures are indicated.

TREATMENT

(1) Chronic dacryocystitis—The patient is seated comfortably in the treatment chair, with his head tilted slightly backward against the head rest. A towel is placed around the patient's neck and allowed to fall loosely down over the chest. One or two drops of a 5% solution of cocain is instilled into the conjunctival culdesac, at two minute intervals, until eight or ten drops have been used, or until anesthesia has occurred. The inferior punctum is dilated gently, with a Wilder lacrimal dilator. The sac is then irrigated with warm boric solution, thru a Tenner canula which has been inserted thru the punctum and attached to a two or three c.c. Luer syringe. Three to six syringefuls are used and very little force is exerted in the irrigation.

During this procedure the patient is asked to tip slightly forward in the chair and hold the emesis basin in such a way that if the solution passes thru a patent lacrimal duct it will run from his nose into the basin. If the fluid returns alongside the canula and thru the upper punctum and none comes thru the nose, then we proceed to probe the duct. Three or four minims of a 1% solution of holocain and one or two minims of a 1/1000 solution of adrenalin are injected thru the canula. The adrenalin shrinks the tissues and helps to prevent bleeding and crust or clot formation. After about ten minutes a No. 1 Bowman lacrimal probe is very carefully and gently passed down thru the duct. This requires a good technic in order to prevent injury to the delicate mucous membrane and bleeding even of a slight amount, as this causes scarring, strictures and undoing of the whole procedure. A very little steady force is required in passing the probe. A No. 2 probe is then inserted in the same manner followed by a No. 3.

The sac is now irrigated again with from six to twelve c.c. of warm boric solution. During this irrigation, the fluid will run quite freely from his nose and is usually free from blood tinge if the instrumentation has been done carefully. The canula is then replaced on the syringe by a second canula of the same type so that it can be dipped into the medicine bottles and two or

three minims of a 1% solution of mercurochrome is drawn up and three or four drops of albolene. The patient leans forward again, while this is injected so it will run from his nose into the basin. The oil floats on the mercurochrome, which is a good thing as the mercurochrome goes thru first and paints the surface, followed by the oil which keeps the duct open and aids in healing without adhesions.

The patient is instructed to apply fairly hot, moist compresses over the sac for twenty minutes twice daily after instilling a drop of 1% mercurochrome into the conjunctival culdesac and to return in two days. At the second visit the sac is irrigated with warm boric solution; mercurochrome and albolene are injected again. It is unusual for the punctum, or duct, to require dilatation more than twice. The trouble will be found much improved at the second visit. If after a week, or two weeks at the most, there is no improvement following the above treatment, the patient should be examined by a rhinologist to be sure that the trouble is not caused by some affection in the vicinity of the nasal end of the lacrimal duct requiring treatment by the nasal route.

(2) Subacute dacryocystitis. In these cases, the swelling and inflammation are cured first, by warm irrigations and injections every day or every other day, in the office as indicated above, and hot compresses and mercurochrome 1% in the conjunctival sac two or three times daily at home in the meantime. After the inflammatory symptoms have disappeared the treatment is carried out as in number one. At times no probing is necessary, when the swelling and inflammation have been cleared up. These cases often require weeks for treatment.

(3) Acute dacryocystitis. The acute condition is treated by hospitalization during which time the procedure is as follows: rest in bed, rather free catharsis, light diet, sodium salicylate gr. 15 after each meal, mercurochrome (1% solution) in the conjunctival culdesac three times daily and continuous hot, moist compresses of boric acid, aluminum acetate or magnesium sulphate solution over the sac region until the symptoms have largely abated. After the acute stage has subsided, the treatment is carried out as in No. 1 above. If the acute stage goes on to abscess formation, incision and drainage are indicated.

OBSERVATIONS: (1) I frequently find that dilatation of the punctum is all that is necessary to cure a long standing case of epiphora.

(2) Mercurochrome is much more efficient in relieving inflammatory conditions of the eye and adnexa, which are accompanied by discharge, than is argyrol of even 25% solution; and I have never seen any permanent stains from it. Argyrol produces argyrosis if used over a long period of time.

(3) Dilatation and probing must be done with great care and gentleness as rough instrumentation produces the same effect as the inflammatory condition — dacryocystenosis and its attendant difficulties—epiphora, conjunctivitis and ectropion.

(4) It is very rare that a probe larger than a Bowman No. 3 is required. A probe larger than a No. 4 should never be used.

(5) Albolene keeps the duct open and protects the mucous membrane.

(6) A Tenner canula is the most efficient lacrimal sac irrigator I have found and is very helpful for injecting the medicines.

(7) I have never seen any toxic effects resulting from the use of holocain in the sac. It affords the patient much relief during the probing.

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OBSTRUCTION OF BRANCH OF RETINAL VESSELS.

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A man, who previously had standard vision in each eye, returned with vision impaired in the left and paracentral scotoma. The ophthalmoscope showed signs of vascular obstruction, and later restoration of the circulation, and vision improved. From the Department of Opthalmology, Stanford University Medical School.

A case where cilioretinal arteries can be seen with the ophthalmoscope to take up the circulation in a part of the retina deprived of its arterial blood supply, is very rare.

REPORT OF THE CASE

J. C., male, aged 34 years, was first seen at the Stanford University Eye Clinic, on January 11, 1927, complaining of headaches for the last three months. These headaches began with a cold, were not constant, came mostly at nights, and were frontal in type. The vision was: O.U. 15/15, and a retinoscopy showed the eye to be emmetropic. The backgrounds were normal. A nasal examination showed: the septum deviated to the left and in contact with the left turbinates; poor left nasal space; no pus seen. A roentgenogram of the nasal accessory sinuses showed: "Beyond slight grayness in both frontal sinuses and the antrum suggestive of some degree of mucous membrane thickening in these regions, there is no roentgen ray evidence of disease in the sinuses." A physical examination was negative.

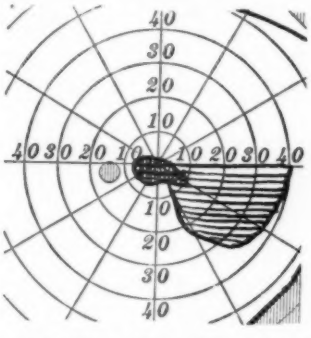

Fig. 1.—Field of vision when first tested.

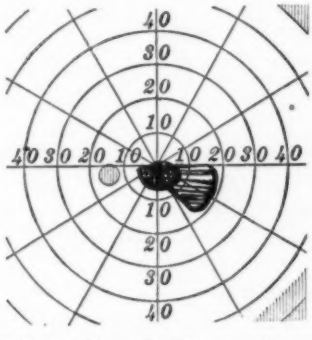

Fig. 2.—Field of vision after five months. Partial recovery.

The patient returned on January 31, complaining that the vision of the left eye was getting worse; the frontal headaches were still present. The vision was: O.D. 15/15; O.S. 15/200. The fundus examination of the left eye showed the following: the disc temporal to the main blood vessels was opaque, somewhat grayish, roughened in appearance, with the temporal margin indistinct. The retina, just temporal to the disc, presented a white oval shaped area extending toward the periphery of the retina and about one and one-half disc diameters in width. The upper part of this area appeared quite white in color and sharply differentiated by a wavy border which passed just below the fovea centralis. The fovea stood out as a vivid "cherry-red spot" lying like a hammock over the wavy border. The inferior portion faded gradually into the normal red fundus. The pale area was unrelieved by any color save for a number of small branches from the lower temporal artery. Two small cilioretinal arteries were seen emerging at the edge of the disc, about 5 o'clock, to curl over it, and disappear from view. They were congested and appeared very prominent, especially the lower one. Starting just off the margin of the disc, about 3 o'clock, a small blood vessel was seen for about a quarter of a disc diameter, and then its continuity was broken for about the same distance. From there on the blood vessel extended toward and over the fovea, skirting the macular region in a semicircular fashion, and then passed on to the peri-

phery of the retina. This vessel passing the pale area was irregular and wavy, beaded in shape and sausage like in appearance. This vessel was crossed by a few twigs from the superior temporal artery. On the following day the fundus picture was the same, except for a pear shaped hemorrhage which appeared on the disc just temporal and above its center.

The field of vision (Fig. 1) showed a partial central scotoma, mostly in the lower half of the fields and contracted to within 8 degrees of the fixation point. The patient could only make out the upper half of the test object at the fixation point when the upper field was taken. It also showed a relative paracentral quadrant scotoma in the lower nasal field to within 40 degrees of the fixation point in the meridians 300 to 0.

The patient was admitted to the hospital for observation and a thoro physical examination. Nothing was found to account for the patient's eye condition, with the exception of the possibility of a chronic sinusitis. The Wassermann reaction was negative. Roentgenogram study of the optic foramina and skull showed the following: "The left optic foramen appears normal, measuring 4.7 x 5.1 mm. (corrected). The right one, however, is slightly enlarged and shows a rather marked indentation in its mesial portion. It measured 4.7 x 6.5 mm. (corrected). Otherwise the roentgenogram is normal."

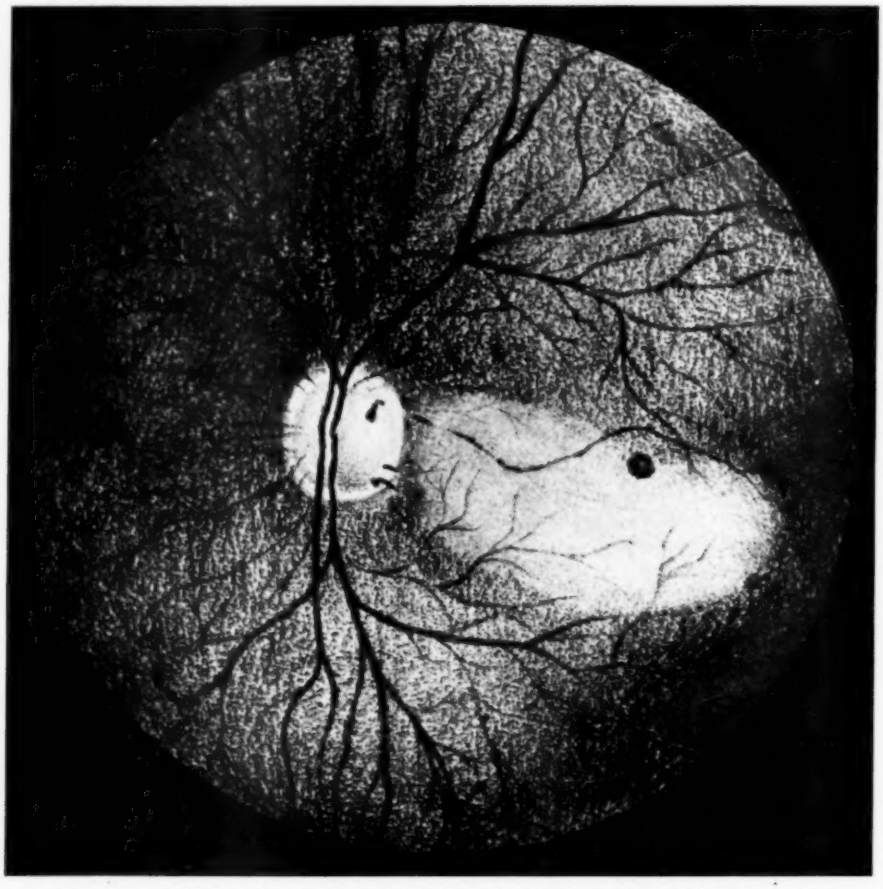

Fig. 3.—Appearance of fundus shortly after obstruction of retinal vessels. Dark spot at fovea, area of exudate from disc to lower temporal part of macula.

February 7, the vision of the left eye was: when looking straight ahead 15/100, when holding the head erect and looking downward 15/15. The hemorrhage on the disc was no longer

seen. The pale area had begun to assume a reddish color. The lower of the cilioretinal arteries was seen as an elongated blood vessel extending into the pale area. The occluded blood vessel had no longer any break in its continuity; it began at the margin of the disc and its caliber gradually increased in size on its way toward the periphery of the fundus.

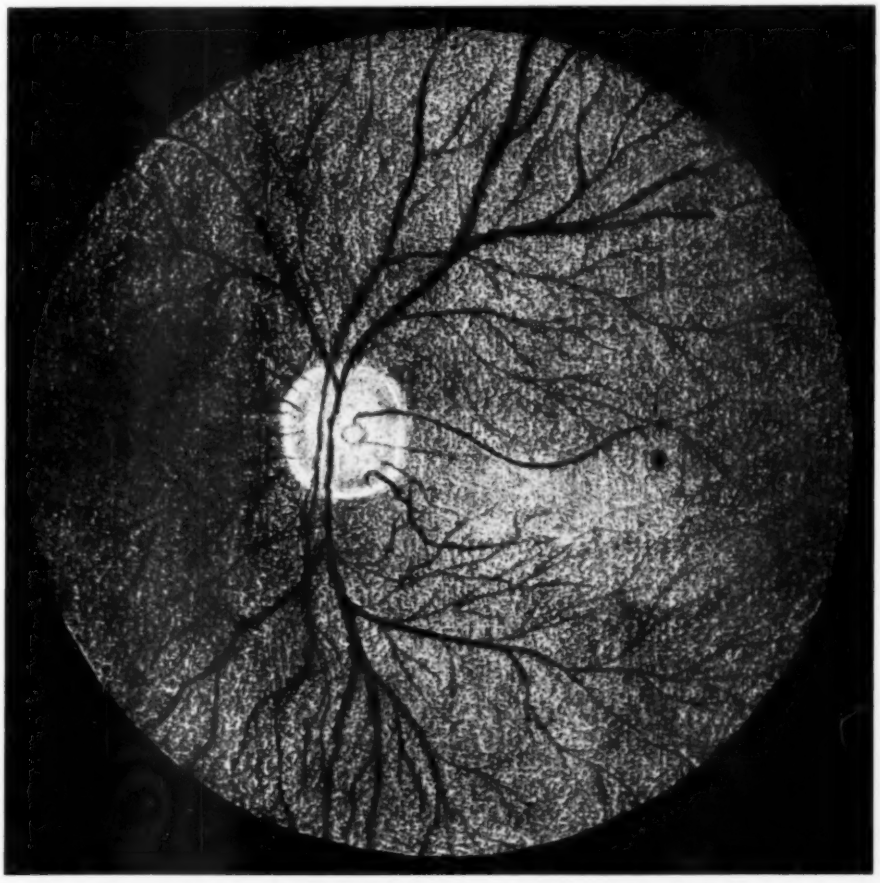

Fig. 4.—Appearance five months after obstruction of vessels; almost complete return to normal.

Three days later the pale area returned to normal color, and the fovea was normal in appearance. The disc showed no abnormalities. The upper of the two cilioretinal arteries extended for a short distance as a fine thready vessel, while the lower one assumed a sharp curve over the margin of the disc and extended in the retina for about two and a half disc diameters with a few fine twigs coming off it. The occluded blood vessel seemed to emerge from the center of the disc. No connection was seen between it and the retinal vessels at the disc.

March 2, an external frontoethmosphenoidectomy, using Sewall's method[1], was done. With the exception of thickened mucosa of the ethmoid cells and the lining of the sphenoid, no pathologic condition was found; no pus was seen.

June 9, the vision was: when holding the head erect and looking upward the patient could only make out hand movements, the vision gradually improved as he moved his eye, and when looking straight ahead it was 15/100. There was a further gradual improvement in vision while moving his eye, and with his eye downward and head erect the vision was 15/15. The occluded vessel was seen to come off from the upper temporal part of a small circular blood vessel which was present just below the surface of the

disc and just temporal to the center of the disc. The vessel had the appearance of an artery and was about two-thirds the caliber of the superior temporal artery. Just below it there was a small threadlike vessel taking origin from the lower temporal part of the circular vessel and extending for a short distance beyond the margin of the disc. No connection was seen between the circular blood vessel and the main retinal vessels at the disc. The rest of the fundus was the same as noted on February 10. No such artery was seen in the right eye. The central scotoma (Fig. 2) was reduced to about two-thirds of its original size and the paracentral relative scotoma to a small quadrant in the lower nasal field to within 20 degrees of the fixation point in the meridians 330 and 0. Since his nasal operation the patient has had no more frontal headaches.

DISCUSSION

Just what the original complaint of headache had to do with the patient's eye condition is hard to state. The vessel is apparently an anomalous branch of the central artery of the retina, extending toward the macular region. The embolus probably lodged in the artery where it appears at the disc. It is unnecessary to discuss the difficulties of differential diagnosis between embolism and thrombosis. The history, retinal findings and subsequent history would justify the diagnosis of retinal embolism. Recent studies, however, have shown that only a minority of cases of vascular obstruction in the retina occur from embolism, and that in nearly all cases of such obstruction thrombi are found in both artery and vein. This article was therefore entitled: "Obstruction of Branch of Retinal Vessels."

The extension of the cilioretinal arteries into the affected area probably helped to retain the vitality of the lower macular region. According to Peter[2] the presence of cilioretinal vessels, which occur in about 16 per cent, sometimes saves central vision. A slit like field, running horizontally, will be preserved in the macular region, even tho the central artery is completely occluded, if the cilioretinal artery is present. The extent of the preserved field will depend upon the size and the extent of the distribution of the cilioretinal vessels. In exceptional instances these vessels are unusually large and have a rather wide distribution. Under these circumstances, a considerable part of the perimacular field will be preserved.

The reason why this patient had no normal vision when looking straight ahead and had normal vision when looking downward, can be explained either by assuming that the occluded artery deprived the blood supply from the upper half of the macular region only, and that there had been a permanent injury to the upper part of the fovea, or by assuming, which is more likely, that the lower half of the fovea was preserved by the cilioretinal arteries. This is borne out by the field of vision. When the patient is looking downward the healthy lower part of the fovea is in the direct anteroposterior horizontal direction and normal vision is obtained.

SUMMARY. 1. Onset of blindness of left eye, preceded by frontal headaches of three months' duration.

2. Fundus oculi changes characterized by: (a) temporal half of disc opaque; (b) white oval shaped area on the retina; (c) cherry-red fovea; (d) occluded blood vessel; (e) congested cilioretinal arteries; (f) hemorrhage on disc.

3. The field of vision showed a partial central scotoma and a small relative paracentral quadrant scotoma.

4. The physical examination was negative; possibility of chronic sinusitis.

5. Extension of the ciloretinal arteries into the affected area.

6. Return of retina and fovea to normal color with reformation of occluded vessel.

7. Vision 15/100 when looking straight ahead and 15/15 when looking downward.

490 Post St.

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CHRONIC CONJUNCTIVITIS AND NASAL INFECTION.

NOAH FOX, M.D., and EMIL DEUTSCH, M.D.

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Nasal pathology is frequently associated with chronic conjunctivitis. Anatomy of the parts offers a probable explanation. Cases reported, in three groups, illustrate cure of conjunctivitis only after nasal treatment.

We are all familiar with cases of chronic conjunctivitis, which fail to respond to our most zealous endeavors at local medication and careful refraction. We refer the patient to the internist for search of any local infections, correct their habits, etc., and yet often forget the intimate relation of the nasal adenexa.

We realize that we are not presenting an entirely new subject, but rather airing some old and adding some new facts, in light of our present knowledge. With this in view, the two essayists, one interested from the ophthalmologic, and the other from the rhinologic standpoint, attempted to coordinate and classify our findings as recorded, and present them again to the profession interested in this field.

One is struck by the frequency with which nasal pathology is found in individuals suffering from both acute and chronic diseases of the conjunctiva.

A careful search of the literature reveals a dearth of material written during the past decade, most of the work seemingly having been done during the period of 1885 to 1895. A few scattered articles are found during the following decade, and fewer articles during the next decade. The earliest observations on this subject appear in G. A. Richardson's work (18th century). Other contributors include Gordon (1885), Greening (1886), Rumbold (1886), Hendrix (1886), Gradle (1887), Clark (1888), T. Dowling (1889), Ziem (1889), Bulson (1898). From 1903 to 1914 articles appear by Palmer (1903), J. I. Dowling (1904), O. A. Griffin (1907), A. Gutman (1907), and Miller (1914). Following this we find articles by Spitze (1917), Magitot (1918), Scott (1919).

The frequency of nasal pathology in cases with chronic conjunctivitis is far greater than one would suspect, unless he routinely examines the nose in all chronic lid conditions. Magitot found in his series of 100 cases, that 30% were associated with acute coryza, 5% with nonluetic ozena, 7% with lues, 13% with chronic sinusitis, 15% with deviation of the septum. In a great number of his cases relief followed correction of nasal pathology present. Myers in his series of 88 cases of chronic conjunctivitis, reports 22 due to displacement of the septum, 16 due to infected adenoids, 13 due to contact of the inferior turbinate with the lateral wall, 9 due to hyperplasia of the middle turbinate, 6 due to genuine and syphilitic ozena, 7 due to hypertrophied tonsils and deviated septum. These are the most recent and largest series of cases on record.

Our problem has not been to note this relationship, but rather to choose those cases where the condition exists and try to correct them. In our series, covering 35 cases of chronic conjunctivitis, i.e. conjunctivitis of more than two months' duration, or where there has been more than one recurrence, we have been able to give positive relief to those individuals where definite pathology is noted in the inferior meatus. Particularly brilliant have been the results in those with low deviation of the septum, vomer spurs, and infected suppurating adenoids in children.

Briefly, the anatomy of these parts may be described as follows: The mucous membrane of the conjunctiva, thru the lacrimal sac and canals, forms one continuous whole with that of the nose. Like the mucosa of the nose it is rich in lymphatics and vascular tissue. The lacrimal duct is surrounded by a system of veins extending the length of the bony canal. Henle cites it as an instance of com-

pressible cavernous tissue not unlike the erectile tissue of the inferior turbinate. The mucosa of the duct itself is thrown into folds projecting into the lumen of the canal, increasing its absorptive area and mechanically preventing the backing up of purulent material from the nose during sleep, or at times when the body is in a horizontal position. Normally, the opening in the canal is a vertical or oblique slit running into the mucosa of the inferior turbinate. While this presents no true value, it is of the nature, under normal circumstances, to impede regurgitation.

MECHANISM OF INFECTION

In the presence of inferior meatus infection it is very possible that, with distortion of the lacrimal duct opening into the nose, infectious material may be propelled into the canal by forceful and improper blowing of the nose, much the same as is seen in the tubotympanic infections associated with nasal pathology. Also, due to the physical proximity and similar anatomic texture of the lacrimal canal and nose, it is quite possible for direct extension of infection to take place along the mucosa of the canal to the conjunctiva. A third source of infection is, of course, extension by way of the lymphatic and venous channels, lining the lacrimal canal. Gordon (1885) suggested a fourth mechanism, i.e. reflex irritation of the vasomotor system of the ocular mucous membrane thru nasal irritation.

In the various types of acute catarrhal conjunctivitis we are readily able to place our finger on the exciting factor, especially in the specific types of infection, as by the Morax-Axenfeld diplobacillus, Koch-Weeks bacillus, gonococcus, streptococcus, etc. In the chronic low grade inflammatory conditions of the conjunctiva, the bacteriologic relationship to the flora is a point very difficult to prove. In most cases, repeated smears of the conjunctival sac and lacrimal canal are negative. And in those cases where various types of coccal organisms are found, we are unable to demonstrate an overgrowth of that particular type. In Magitot's 100 cases, he reported most of them negative for causal bacteria.

The series we are reporting divide themselves into distinct groups:

1. Follicular conjunctivitis in children associated with adenoid and tonsil infection.

In this group, the history is of "pink eye" associated with some blepharospasm and epiphora. Questioning will usually bring out the added information of continuous head colds and running nose, during which time the eye condition occurs. Often, the parent states, that the eyes are perfectly normal thruout the summer, only to become involved again with a fresh cold. Each attack lasts several weeks to two months, gradually disappearing. A typical case is the following:

M. G., male, aged 8, schoolboy, seen the first time in February, 1924. Complaint: redness of both eyes, tearing, small amount of discharge in corners of eyes on arising. Eyes sensitive to light. Eye examination, R 20/20 +, L 20/20 +. Superficial injection of vessels of both bulbar and lid conjunctiva. Follicles about the size of a pin head, pale in color, giving conjunctiva a cobblestone appearance. The retrotarsal and bulbar conjunctiva smooth. Smears negative. Internal eye examination: negative. Nasal and pharyngeal examination reveals hyperemia of anterior tonsillar pillars. Tonsils enlarged, reddened, crypts bulging, mucopurulent material present in nasopharyngeal vault and both inferior meati. No other pathology. Given Zn. sulph. ¼% t.i.d. and boric irrigations t.i.d. Under treatment for six weeks, when patient was discharged. Patient seen again in December 1925 and March 1925. At both times findings were much the same as previously noted. May 1925, tonsils and adenoids removed. To date, there has been no recurrence of the eye symptoms.

In four of these we found staphylococcus aureus in conjunctival smears.

2. Chronic catarrhal conjunctivitis associated with intumescent rhinitis, but no other grave nasal pathology:

Whether or not this is an earlier phase of the next series we are unable to say. A typical case is as follows:

V. D., age 45, female, housewife, first seen in July 1925, complains of burning, itching, and redness of eyes, thickening of lids, foamy discharge present most of the time. Symptoms present for the past seven years, since patient has been in Chicago, coming from Iowa. Has had periods lasting from one to three months, during which time eyes were comfortable. Volunteered information that eyes feel better when she is visiting relatives in Iowa, where air is clear and dry. Has had several refractions by competent oculists.

Eye examination: R 20/20, L 20/20.

Wearing: R + 0.37 + 0.25 cyl. ax. 150°, L + 0.37 + 0.25 cyl. ax. 90°.

Refraction checked, no change made. Lids reveal a hyperemia of conjunctiva, veins tortuous, protruding, and increased in size, lid edges thickened. Smears negative. Interior of eye, no pathology noted.

Nasal Examination: reveals great swelling of nasal mucosa over inferior turbinate. Responds very quickly and entirely to adrenalin.

Diagnosis: Intumescent rhinitis. Inferior turbinates cauterized by deep single linear cautery. Phenol ¼% in liquid albolene as nasal spray, t.i.d. Resorcin 2% for eyes t.i.d.

Relief followed after three weeks, and patient has been comfortable up to present writing. She is still using the nasal spray, but discontinued the eye drops after six weeks. (This patient had been on resorcin for a long period before, without relief.) An interesting point in this type of patient, is the prompt relief obtained by getting away from Chicago climate and atmosphere, to a drier and cleaner atmosphere. It may be added, that our greatest difficulties were encountered in giving aid to this type of eye case, and recurrences of symptoms were frequent. But in every instance symptoms were most severe when the nasal condition was active.

3. Chronic calcareous granular conjunctivitis associated with nasal deformities, i.e. low deflections of septum; vomer spurs, etc. A typical case is as follows:

H. E., age 30, male, football coach, seen April, 1925, complaining of burning, itching, and foreign body feeling about eyes. More severe in winter than summer, and present for about eight years. Only other significant feature is that patient suffered a fracture of the nose about eight years previously, in a football game, since which time nasal breathing has been difficult.

Eye examination: R. 20/20, L. 20/20; under homatropin: R. and L. +0.50. A thickened, red conjunctiva involving the lids more than the bulb. Numerous small calcareous granules present in the conjunctiva of the lid and retrotarsal folds, with about the same distribution in both lower and upper lids. Left eye worse than right. Smears negative. Internal examination: negative.

Nasal examination reveals an anterior subluxation of the septal cartilage, which is pressing firmly against the left inferior turbinate, and almost entirely occluding the inferior meatus. Vomer exostosis noted on the right side. Some mucopurulent material noted on the left side, after shrinking the nasal mucosa. Patient treated with Zn. and Ag. Nit. ¼ % over various periods with only temporary relief.

July 1925, septum and exostosis removed. Placed on liquid albolene spray. No treatment to eyes, except that calcareous granules were carefully removed. Symptoms gradually disappeared and the eyes have remained clear to date. This type of case together with the first have given us the most gratifying results. Limitations will not permit the citation of other cases, but enough has been presented to demonstrate the reality and importance of this subject, which should elicit the interest of the ophthalmologist, otolaryngologist and general practitioner, if these cases are to be intelligently treated.

Conclusions: A suppurative condition present in the inferior meatus of the nose apparently is a strong causal

factor in chronic catarrhal conjunctivitis.

Correction of nasal pathology frequently gives relief or permanent cure of associated chronic conjunctivitis.

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CONGENITAL BUPHTHALMOS.

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Early cases of buphthalmos rarely come to histologic examination. This is a brief case history and report of postmortem findings of a child dying at the age of three months. The illustrations show the general condition of the eye, the development of the ciliary region, and a section of the greatly enlarged thymus gland.

A. C., age 3 months. Father 55 years, mother 50; four other healthy children. Brought to me June 15, 1926; had not been discovered to be blind until my examination on that date. Accoucheur had difficulty in getting child to breathe; weighed about three pounds; rapidly increased in weight; acquired protuberant abdomen and head enlarged.

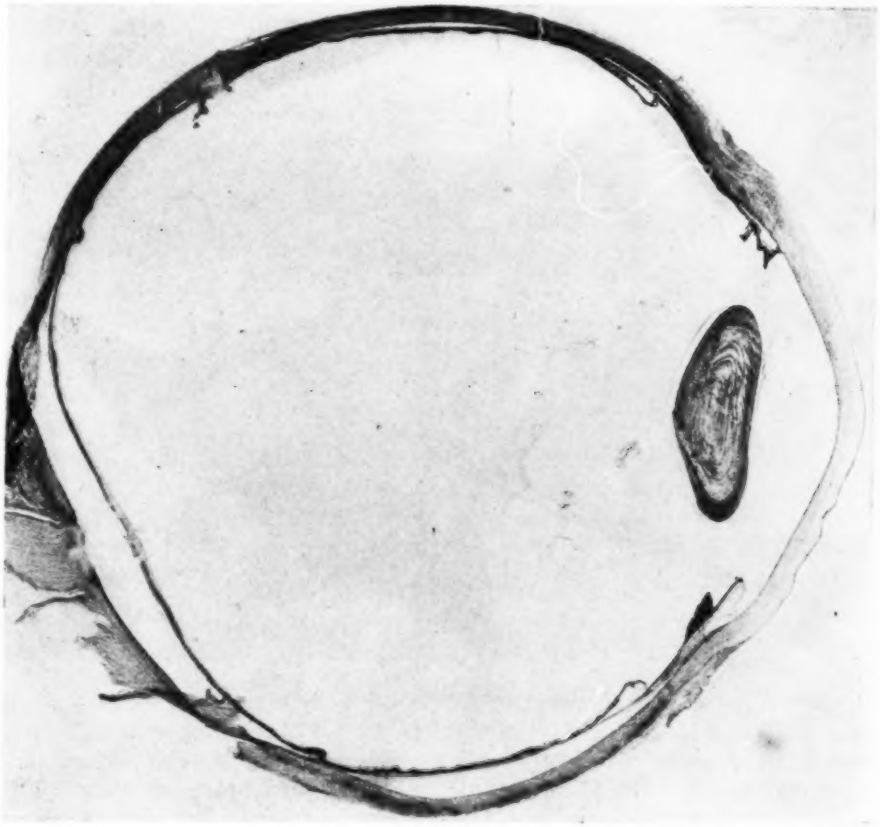

Fig. 1.—Buphthalmos, Wurdemann's case, showing thinning of section of globe of all ocular coats, and incomplete development of ciliary body and iris.

Diagnosis: Eyes, congenital buphthalmos; pupils fully dilated; lens partially opaque; blue sclera. Had light attack "supposed to be pneumonia" 3 weeks before. Body shows evidences of cretinism; splay fingers; defective development of big toes; protuberant abdomen; frontal bosses protuberant; external ears poorly developed; occipital and parietal spaces wide between bones of skull; evidences of rickets. About June 18th had great

difficulty in breathing; developed Cheyne-Stokes breathing. Died evening June 22d from heart failure.

Postmortem June 24 showed perforate foramen ovale of the heart; greatly enlarged thymus gland, a lobe of which impinged on the heart. Abdomen protuberant. Belly and skull not opened. Left eyeball, thymus and portion of lung removed.

Report War Department Army Medical Museum.

Gross description—Small, partially collapsed eye, cornea appearing larger than normal proportionately.

Microscopic examination—Thymus—Shows an unusually large number of keratinized Hassall's corpuscles. Round cell elements appear essentially normal.

Lung—Shows incomplete aeration; partial atelectasis. G. R. CALLENDER.

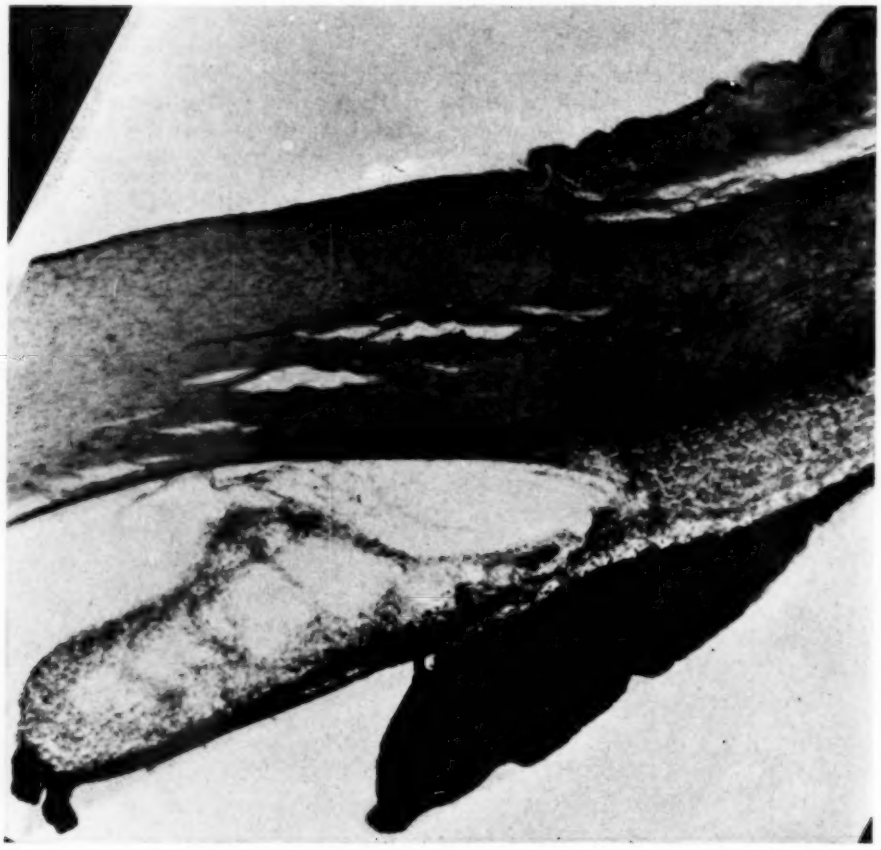

Fig. 2.—Buphthalmos section thru ciliary region.

PATHOLOGIC REPORT: Eye of infant showing incomplete aniridia. Filtration angle bridged by embryonic tissue. Ligamentum pectinatum is in embryonic stage of development. Posterior part of eye is normal. Cornea measures 12 mm. in diameter, abnormally large.

F. H. VERHOEFF.

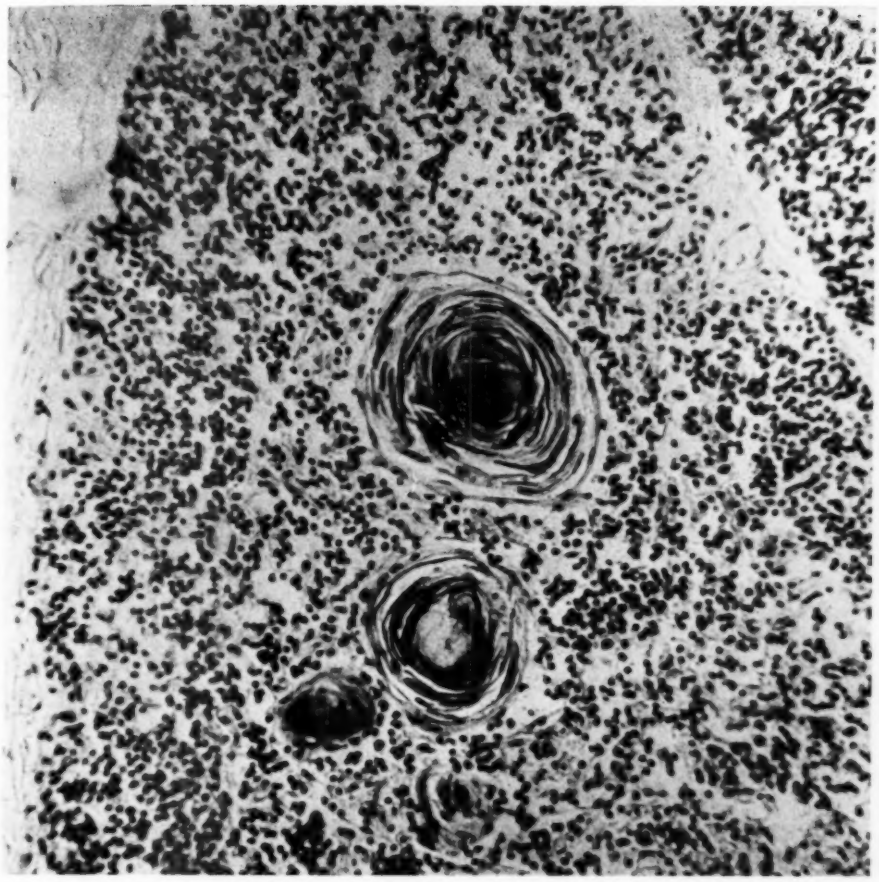

Fig. 3.—Buphthalmos, section of thymus gland. Keratinized Hassal's corpuscles.

SECONDARY DIVERGENCE.

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Divergence following tenotomy of the internal rectus occurs sometimes long after that operation. To correct it an operation, planned to meet the particular needs of the case, must be done. This may be either a resection, or advancement of the internus, correcting its faulty attachments and the position of the caruncle, followed by tenotomy of the externus.

My reason for writing this paper on the subject of secondary divergence is the paucity of literature relating to this condition. It is a subject of considerable importance to the practicing ophthalmologist, in that it is encountered not very infrequently, either as a late result of his own earlier operative work, or as the result of operative work of others. The discussion which I offer in this article is based on my experience and observation at the New York Eye and Ear Infirmary, where many patients suffering from this handicap present themselves for treatment.

Secondary divergence is always the result of complete tenotomy of the internus done in earlier life, generally during childhood. It frequently does not make its appearance for months or years after the time of operation. The

resultant effect in these cases is more disfiguring than the original condition, especially if there is a retraction of the caruncle, which gives the eye a glassy, unnatural appearance. Having seen so many of these undesirable ultimate results, I have come to the conclusion, as have many operators, that, eminently satisfactory tho the primary result of uncontrolled tenotomy of the internal rectus often is, it is not a scientific procedure and should be discarded in favor of recession; or at least that a controlling stitch should be used.

After an uncontrolled tenotomy this muscle retracts to a greater or less extent depending on the amount of freeing of lateral attachments and incisions of Tenon's capsule, depending on the strength of the new cicatricial attachments, also depending upon the pull of the externus, owing to the strength of that muscle and the amount of shortening that may have been done to it. The end of the cut tendon of the internus becomes reattached to the underlying sclera, at a point more or less remote from the original insertion according to the amount of immediate retraction of that muscle. This new attachment, however, is never so strong as the original insertion and, being of cicatricial tissue, is subject to stretching. This reattachment to the sclera exceptionally may not occur, and the muscle in this case will not act by traction on Tenon's capsule, conjunctiva and caruncle. The muscle after the lapse of time frequently becomes atrophic to a marked degree due to lack of normal use. The trauma incident to this operation results in the matting together of the conjunctiva, Tenon's capsule and muscle. Resultant to this with the retraction of the muscle, the caruncle is often drawn back from its normal position.

The treatment of this condition of secondary divergence is surgical. Exercises and lenses are practically valueless after the deviation has taken place. The same general surgical rules that apply to a primary divergence are applicable to the secondary type, but difficulties are encountered that are not met with where a previous operation has not been done, and the technic must be modified according to the exigencies of the particular case. Having determined the amount of the divergence, we first proceed with the intention of doing a resection of the tenotomized internus. The incision thru the conjunctiva is made in the usual location and this membrane is dissected with care from the underlying tissues back to the retracted muscle and over it as far as adhesions exist. This is not always an easy task on account of scar tissue and bleeding. Care must be exercised not to cut the attachment of the muscle to the sclera. This could be readily done inadvertently in some cases owing to the attenuated state of this attachment. Now a hook is passed under the muscle as in the primary operation and the muscle is clutched with a muscle forceps and cut close to its attachment. All adhesions between the muscle and sclera must be broken up. From this point the classical resection may be done if practicable.

Quite frequently, however, because of the thin tendon, it is necessary to make one suture suffice, and, as the severed stump often offers insecure anchorage, the suture or sutures may have to be also passed thru the deep, firm episcleral tissue. It is not necessary to include the sclera in these stitches.

In the event that the tenotomized muscle has retracted far back or has failed to become reattached to the sclera, a resection is not indicated. In this case we do what is, in effect, an advancement, suturing the cut tendon to the episcleral tissue, as far forward as may be deemed advisable in the case under operation. We pass the anchoring sutures thru the deep episcleral tissue alone, as in the operation of recession, and have found these sufficiently secure. In extreme cases of divergence, a resection and advancement of the retracted muscle may both be done. The conjunctiva if not included in the muscle stitches is now sutured.

The caruncle, if still retracted after the muscle sutures are tied, may be drawn back in position and there re-

tained by the conjunctival sutures, after excising as much of the conjunctiva as necessary, or this procedure may be done at a subsequent time.

Having performed the resection or advancement of the internus, we now tenotomize the external rectus fully. After doing this, we must be sure that all adhesions between the muscle and the sclera are free, and also between the muscle and the conjunctiva. Otherwise we might get little result from the latter procedure. The conjunctiva over this muscle is sutured.

We should now have an overcorrection of about ten degrees. Both eyes should be covered for forty-eight hours. Any convergent deviation remaining after a month or six weeks may be treated by exercises or other nonoperative orthoptic measures.

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PRACTICAL RETINOSCOPY WITH THE PHOTOSCOPE.

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In skiascopy the point of reversal, or neutral point of movement, may be found by changing lenses before the patient's eye, or by changing the observer's distance. The photoscope gives a convenient way of combining these two methods, adding to the ease and accuracy of the test.

There are, in general, two methods employed in static retinoscopy for neutralizing the shadow movements and measuring the error. One is the fixed distance method. Here the examiner at a chosen distance of, say, 40 or 26 inches uses plus or minus lenses to shift about the neutral point, (often called the point of reversal). He does so until this point reaches his eye, strictly speaking coincides with the nodal point of his eye. If, for example, the examiner at his fixed distance and using the plane mirror gets a "with" movement he knows the neutral point is behind him. He then places before the patient's eye plus lenses, which move the neutral point towards him and continues with the plus lenses until this point reaches him. If, on the other hand, the examiner first gets an "against" movement he knows that the neutral point is in front of him. He then uses minus lenses until, again, the neutral point is brought up to him.

While this is the method most commonly used it has a number of disadvantages. One of these disadvantages is the necessity of numerous lens changes fatiguing alike to patient and examiner. Furthermore, every time the examiner moves over to change a lens there is apt to be a change in the patient's fixation and simultaneously a change in the fundus spot examined.

The other method is the variable distance method. Here the examiner moves back and forth until he locates the neutral point. As he usually starts from a position beyond the neutral point and has to approach the patient in order to get at the neutral point, this method has been called the "approach method." The specific difference between the two methods is briefly this. In the first method the neutral point is made to move to the examiner who occupies a fixed distance. In the second method the examiner chooses to move to the neutral point, which is usually first brought within convenient limits.

To outline this method. If, for instance, the examiner from an initial position of, say, 40 inches gets an "against movement," he knows the neutral point is in front of him. He then approaches the patient while working with the retinoscope until the "against" movement changes to neutral. By noting this distance, either by judging the distance, or by a mark on

the floor or wall, or by the use of an auxiliary tape measure, the examiner knows what working allowance to make. If, on the other hand, the examiner from his initial position gets a "with" movement he knows the neutral point is behind him. He may then, and often can, move backwards until the "with" movement changes to neutral. However, this is not always possible or convenient in most cases. Accordingly, if the examiner gets a "with" movement from his initial 40 inch position he inserts a plus lens of sufficient strength to give a distinct "against" movement and then moves in towards the patient to locate the neutral point. Very little practice is required to be able to judge about how strong a plus lens is necessary to change at once the "with" to an "against" movement.

One great advantage of this method is that few lens changes are required, making the examination easier, quicker and more comfortable for both patient and examiner. But the great drawback of this method is that as the examiner approaches the patient, if the latter is made to fixate over the examiner's head or over his shoulder, the obliquity of the examiner's observation line constantly increases. As a result different and more peripheral parts of the fundus become successively the source of the fundus reflex. Moreover, the examiner's increasing obliquity of observation introduces an increasing cylindrical element, which not only causes irregular shadow movements but seriously impairs the accuracy of the findings.

All these difficulties of the variable distance method may be overcome by the use of the photoscope; (described in the AMERICAN JOURNAL OF OPHTHALMOLOGY, January, 1927; subsequently modified and improved. With this device for holding the patient's fixation there is no change in the part of the fundus examined nor is there an increasing obliquity of observation as the examiner approaches the patient. In fact the examiner, at whatever distance he is, works practically along the patient's visual axis getting very close foveal refraction.

A combination of the two aforementioned methods lends itself admirably for use with the photoscope, as will be shown presently. I have called this combined method bimetric retinoscopy as we employ two methods of measurement in our neutralization. Partly we use the dioptric equivalent of the distance and partly the dioptric value of the lenses. Another twofold application of this bimetric method is that we use one measurement for finding the spherical correction and the other measurement for finding the cylindrical correction.

A word about the cylindrical correction. Generally speaking this is the most difficult and uncertain part of a refractive examination. The spherical element is readily found once the cylindrical correction is correctly determined. For there are special difficulties involved in getting at the cylinder. One must be careful not only to find the right strength but also, and what is more important, to locate the correct axis. In fact finding the exact strength is secondary, nor is finding the exact strength necessary or possible in most cases; but the accurate location of the cylinder axis is of prime importance. For the spherical correction, however, where no axis is involved and only the amount has to be determined and where there is happily even less need for absolute exactness, the difficulties are very much less.

Now bimetric retinoscopy offers an excellent combination method, whereby the sphere can be determined by the examiner moving towards the neutral point and the cylinder determined by the use of minus cylinders at a fixed distance. The distance chosen will be the one where the examiner first locates the neutral point as he approaches the patient. There is a special advantage in determining the cylinder at this distance; for astigmatism presents, from the standpoint of retinoscopy, several features peculiar to itself. These help to recognize the condition. One of the outstanding

features is the band shape appearance of the reflex and shadow in an astigmatic eye. The direction of this band indicates the direction of the cylinder axis. But this band shaped reflex and shadow is marked only when the examiner is at the neutral point for one meridian. Otherwise the direction and form of the band are more or less hidden by the error in the other meridian. Therefore in the bimetric method, by stopping at the first neutral point to determine the cylinder, the band phenomenon is striking and can be made best use of.

The following illustration may serve to bring out the point more clearly. Suppose the examiner from a starting point of 40 inches gets an "against" movements in all meridians. It is generally difficult to tell now whether or not there is any astigmatism. He then moves in towards the patient, working his retinoscope in more than one meridian, until he gets neutralization in one meridian. This determines the spherical correction. At this point the band shaped reflex and shadow will be plainly visible. The examiner now stops at this distance and uses minus cylnders to neutralize the other meridian. The correct axis is easily determined by the direction and appearance of the band.

Suppose, on the other hand, that the examiner from his initial 40 inch distance gets an indefinite, or a "with" movement, in all directions. He then places a plus sphere before the patient's eye of sufficient strength to cause distinct "against" motion in all meridians. Now he can proceed with the neutralization, first by moving in to get the sphere and then by using minus cylinders at the first neutral point, as discussed in the preceding paragraph.

The stopping point at which cylinders are introduced can most conveniently be made to lie somewhere between the initial 40 inch distance and the position of the photoscope at 20 inches. It is not necessary to know exactly the distance at which the first neutral point is found and cylinders introduced. The examiner's judgment of the distance is sufficient, especially after a few trials. For this distance represents the retinoscopic overcorrection in order to get neutralization at a definite distance. To make these findings valid as a distance correction, a minus lens value representing this distance has to be added to the neutralizing lenses. And an allowance of a quarter diopter more or less is unimportant here; since for the final, critical quarter diopter correction, the subjective test is used immediately thereafter.

However, if an examiner wants to know his distances exactly he can attach one end of a thin tape measure to the photoscopic stand and let the other end, weighted, slide thru the fingers of the hand holding the retinoscope. He can then read off the spherical neutralizing distance exactly. But this is practically unnecessary in ordinary work.

This combined retinoscopy method, of using the variable distance for finding the sphere and the fixed distance for finding the cylinder, is quick, easy and accurate. It involves a minimum of lens changes and is therefore more pleasing to both patient and examiner. When used with the photoscope the same fundus spot can be viewed thruout the examination and at all distances.

Moreover, and what is of the greatest importance, with the photoscopic arrangement there are no irregular shadow movements at closer range, nor are there any false values introduced into the spherical or cylindrical elements of the correction. Whereas without the photoscopic arrangement, the increasing obliquity on approaching would vitiate the value of the test. Because this combined method is so closely bound up with the photoscope, the whole method may be called bimetric photoscopic retinoscopy.

SOCIETY PROCEEDINGS

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

1926.

SIR JOHN HERBERT PARSONS, F.R.S., President.

Metaplasia of the Tissues of the Eyeball.

MR. TREACHER COLLINS said that metaplasia was the production of specialized tissues from cells normally producing tissues of other orders, owing to an alteration in environment, and not necessarily, nor even primarily, because of altered function. These changes seen in ocular tissues he divided into embryologic, pathologic, neoplastic and biologic. An instance of the first of these was the formation of a new lens from the termination of the secondary optic vesicle in larval newts, after destruction of the normal lens; and, in man, the substitution of skin for conjunctiva when the lids, in the course of their development, did not close over the eye. A further example was the substitution of retinal tissue for neuroglia in the optic nerve.

In the pathologic form occurred the formation of bone in the choroid, and the substitution of fibrous tissue for the endothelium lining Descemet's membrane. He gave other instances. An example of neoplastic metaplasia was the formation of spindle shaped cells in growths which were primarily endothelial; another was the mesoblastic tissue met with in connection with tumors of the lacrimal gland and of the orbit. The biologic form included differences in the constitution of the sclerotic in various species of animals. For instance, the muscular tissue of the iris was composed, in some animals, of unstriated muscle fibers, in others of striated fibers.

Operation for Partially Contracted Socket.

MR. E. AFFLECK GREEVES said the essential feature of this procedure which the author had devised, was the removal from the orbit of the fat and fibrous tissue. If this were not done, the suturing did not seem to promise permanency.

Discussion. MR. THOMSON HENDERSON claimed to have devised and carried out a very similar operation ten years ago.

SIR ARNOLD LAWSON said he formed the idea from Mr. Thomson Henderson's description of his own operation, that the result would probably be somewhat evanescent. Mr. Henderson, however, said he had had cases in which the result had lasted for years. The conjunctiva was pinned down to the skin, and it proved to be very permanent.

MR. G. MAXTED spoke of the difficulty caused by the silk cutting thru the conjunctiva, especially if the sutures had to bear tension.

MR. GRAY CLEGG described a modification, which he had been employing, by passing a fine scalpel from the side and making a sagittal section; so that without cutting in any way one could draw down the conjunctiva and form the sort of sulcus which Mr. Greeves pointed out.

THE PRESIDENT said ophthalmologists would be grateful for a successful operation for even partially contracted socket. He referred to Weeks' operation for completely contracted socket, which he saw performed in America by its originator.

Comparative Anatomy of the Nictitating Membrane.

DR. P. STIBBE, lecturer on Anatomy, Liverpool University, gave a lantern exposition on this subject.

He said the purpose of this membrane was to protect and clean the cornea, as its function was to move rapidly to and fro across the front of the eye. In the bird the membrane was a crescentic structure, covering the inner fourth of the margin of the cornea, and it was continued beneath the lower lid, and was connected with muscle at the back of the eyeball. Under the eyeball was a sheet of fibrous tissue, slung like a hammock. Two small fibrous bands helped to keep the

lower eyelid in position while the nictitating membrane moved. He discussed in considerable detail the mechanics underlying the movements of the nictitating membrane, and passed to a consideration of the function of the human plica semilunaris. He suggested it was an additional apparatus in possession of man, not for the purpose of protecting the cornea, but to protect the puncta lacrimalia and lacrimal canals, and to prevent foreign bodies which might enter the eye leaving that way. In the amphibian the lower lid consisted of a membrane part and a lid part. For the membrane in animals he preferred a name he had given it, "the intercepting membrane."

Discussion. MR. TREACHER COLLINS referred to the function of the protruso bulbi. In serpents the third eyelid formed a permanent covering.

Nystagmus (Other Than Miners').

A discussion on this subject occupied the whole of Thursday afternoon, and was opened by MR. B. CHAVASSE. Mr. Chavasse said the subject could be approached by various channels; it could be regarded as a movement, as a symptom, an adaptation, a habit, a neurologic problem. True nystagmus, that evoked when the eyes were directed straight ahead, might increase in certain directions of the gaze, and so appear to be pseudonystagmus. The old terms "nystagmus" and "pseudonystagmus" he would like to see abolished and "with field central"; "with field peripheral," etc., substituted. If the nystagmus was jerky, with a widespread field, and was not changed by occlusion, it was probable that the patient had a more widespread condition. If the movements in the two eyes were dissociated, probably the lesion was comparatively peripheral; whereas if they were associated, a lesion of higher and more remote centers would be suspected, one which affected the neuromuscular end organ. He discussed nystagmus as a neurologic problem in some detail.

DR. HUGH E. JONES exhibited a model to remind one of the semicircular canals and the relation in space of these to other structures in various postures of the head. He also rotated in the chair a man who had destruction of the labyrinth on both sides following influenza, and proved the absence of nystagmus after that procedure. He subjected a normal person to the same amount of rotation and demonstrated the ensuing nystagmus.

DR. GORDON HOLMES said that in a discussion on nystagmus all the components must be taken into account, but the neurologist was mainly interested in the central mechanisms brought into play in adjusting the eyes, and in stimuli of sight in the visual field. Nystagmus could not be regarded as a mere local tremor of the eyes, it was a coordinating act. It could take place even when the muscles were palsied or paralysed, as he had described a case in which the external rectus on the right side was palsied in association with a cerebellar lesion, yet nystagmus was regular, and symmetric in both eyes. In nystagmus the essential feature was the slow phase. In many conditions a terminal fixation nystagmus took place, and among these were sthenic states and chronic, including alcoholic intoxications. He had never found, in his large experience of gunshot wounds of the head in the war, nystagmus occurring from a primary lesion of the cortex or of the forebrain as such.

DR. SIDNEY SCOTT discussed the phenomenon from the standpoint of the otologist. He said the latter made his observations on this in cases of people with normal vision, and he would exclude cases of central nervous disease. It was assumed that nystagmus could be set up in the labyrinth as a result of irritation, and by a caloric stimulus. The otologist was sometimes asked whether nystagmus was the cause of the vertigo, or vice versa, and the reply he gave to that was that both were due to a common cause. But nystagmus was not associated with vertigo when it was not of labyrinthine origin. In acute otitis media a nystagmus was sometimes met with which must be distinguished from that following destruction of the labyrinth. When nystagmus was due to otitis media it

would disappear when the tympanum was drained and there was no immediate risk of extension of the disease to the labyrinth or to the meninges. If there was absence of response to the caloric test, the labyrinth should at once be opened. There was nystagmus also accompanying chronic fistula.

The Etiology and Treatment of Hypopyon Ulcer.

Mr. J. Gray Clegg introduced the discussion, his remarks being based on 27 years as Hon. Ophthalmologist at Manchester Royal Eye Hospital, 160,000 patients having been under his care there in that period, 9,576 as in-patients. Of the total, 0.24% were cases of hypopyon ulcer; 77% were males. In 53% of all the hypopyon cases there was a definite history of trauma, and most of the subjects were either miners or laborers. The condition was not found in pit ponies, and it was not due to infection from underground stables, as the air currents were forced towards those stables. Most of the patients with this condition which Mr. Clegg saw were below par in a general way. Alcoholic addiction he felt had a distinct influence in lowering resistance and in retarding recovery. In 26% of his cases of hypopyon there was conjunctivitis, and in 13% dacryocystitis. Intranasal conditions he saw only twice. It was impossible to say how far infection was brought about by workmen's dirty fingers, dirty handkerchiefs, or by attempts to lubricate the eye by sputum. The most frequent associated organism he had found in these cases was the encapsuled pneumococcus of Frankel-Weichselbaum.

Mr. Clegg stressed the importance of keeping the general health as robust as possible, by simple and nourishing diet and open air, and purgatives when necessary. Pain could be relieved by morphia or codeia. The teeth must be put right. With regard to local treatment, a bandage he considered retarded recovery as the affected region was thereby kept in contact with the pus and toxins. Among lotions he mentioned: hydrarg. perchlor. 1 in 10,000; zinc sulph. gr. 1 ad. oz. 1; mercurophen, 1 in 8,000, quinine hydrochlor. gr. 4, formalin 1 in 2,000 or weaker. Drops referred to were: argyrol 10% to 50%; protargol 5% to 10%; dionin up to 10% strength; adrenalin 1 in 1,000. Darier, he said, strongly recommended the instillation, every two hours, of a 2% solution of zinc salicylate. Powders mentioned were iodoform, xeroform, nosophen, airol; and of ointments iodoform gr XXX ad dr. I. A 20% ointment of cassaripe was recommended by Chandler of Boston and by Risley of Philadelphia. Subconjunctival injections were usually given with one-third the quantity of acoin to overcome the pain caused. Another injection was cyanide of mercury in 1 in 4,000, and another was sodium chloride 1% to 5%. To the ulcer direct could be applied hydrarg perchlor. in solutions up to 1 in 100. The burning sensation could be overcome by instilling drops of holocain.

Heat could be applied indirectly, i.e., to the closed lids, either by the Maddox pad or by lint repeatedly wrung out in hot thin starch water. Or heat could be applied direct to the ulcer by holding a cautery knob or loop close to the ulcerated area several times daily, to dry its surface. Or a nicer regulation of the temperature used was possible by Shahan's electrothermophore. Blue light did not prove useful. Lawson and McKenzie had advocated radium.

In all cases it was well to irrigate the ulcer, drying it with blotting paper, gently mopping out with a dry swab, then scraping and cutting away the projecting margin. A favorite agent to use was carbolic acid liquefactum. An accurate application was by Paquelin's benzol vapor cautery. The operative measures were entered into in detail. Of indirect measures some surgeons preferred a large peripheral section. Iridectomy was not performed. In regard to direct means, frequently scraping of the necrotic mass from the ulcer surface, especially at the advancing edge, was done. Verhoeff made crucial incisions into the base of the ulcer. A more heroic measure was the Guthrie-Saemisch section, which resulted in

a lowered tension, and a slow drainage of the anterior chamber, allowing the hypopyon to be effectively dealt with. No sudden lowering of intraocular tension must be brought about, or hemorrhage might result.

He also dealt at length with the bacteriology and complications, and concluded by saying that workers could not have it too firmly impressed upon them that it was necessary to look upon a watery or discharging eye as a serious matter, and that skilled advice should at once be sought. Much protection could be afforded if men would wear goggles at their work.

Mr. S. H. Browning dealt with the subject as a bacteriologist. He said the organism most frequently associated with hypopyon ulcer was the pneumococcus, but it only became established on the cornea when its surface had become eroded. He believed infection was brought about by organisms which were already on or in the conjunctival sac and which the erosion had enabled to gain access. Cultures should always be taken from the advancing edge of the ulcer. If bacteriologic examination of all ulcers were carried out, many eyes might be saved by it. The most virulent cases he had seen had been due to B. pyocyaneus, and in some of those cases he had been able to trace the infection to an ear discharge. He was not impressed by autogenous vaccines in these conditions. He spoke of the treatment of these ulcers by magnesium sulphate and hexamine.

Mr. M. S. Mayou showed a slide of a very early stage of pneumococcal corneal ulcer following the entry of a foreign body. He treated the ulcer with pure carbolic, and it did not spread.

Mr. McMullen considered these ulcers were now not so frequently met with as 25 years ago. As most of the cases were preventable, prophylaxis should have first consideration. He insisted that, even for slight injuries, the treatment should be skilled. It was now his custom to use the galvanocautery for all hypopyon ulcer cases, except in those with only slight ulceration.

Mr. A. C. Hudson said intraocular pressure exerted a very unfavorable influence on the course of the disease; it interfered with the normal lymph supply of the cornea. When the cautery was applied it should be limited to the crescentic edge of the ulcer, and it should not be applied deeply. In addition he had used, alternatively, ½ gr. chloride of zinc drops, or 5% protargol. If Guthrie-Saemisch section were decided on, it should be done early, as tension did not need long to become seriously greater.

Dr. Freeland Fergus said he had seen a very large number of these cases, as he had always practised in a large industrial area in Glasgow. If the ulcer was seen early, the whole treatment resolved itself into a question of asepticity; the free use of the douche and the instillation of a few drops of pilocarpin. He was against the use of both ointments and bandages, as they harbor and retained what it should be the effort to evacuate.

Mr. Edgar T. Stevenson agreed with what Mr. McMullen and Dr. Fergus said. At hospitals removal of foreign bodies was usually well done, but the after treatment of the case was practically neglected. Nurses and others brought into contact with these cases should have been well trained in eye work. The ulcers seen in coal mining districts seemed to be especially virulent; he did not know whether this fact had any actual relation to attributes of the coal.

Mr. M. McNabb said there was no panacea for these cases. They were due to injury and infection of the lacrimal sac. Vaccines and serum therapy had not been beneficial in his hands. He always injected drops of a 20% solution of argyrol, and if dacryocystitis was present he excised the sac.

Col. McCallan pointed out that most subjects of hypopyon ulcer had dental sepsis, and until this was cleared up, local measures directed to the eye were not likely to avail. Also, a septic nose should be dealt with. House surgeons should not be allowed to carry out cauterization of these

ulcers without instructions and supervision.

Mr. M. Hepburn said there was some divergence of view as to the best means of treating these ulcers. There seemed to be no means of determining, in a given case, whether an ulcer would be severe or not, therefore it was safer to adopt measures best suited to the severe condition, especially as much of the resultant scar became absorbed later. He always allowed the affected eye to remain uncovered, carrying out irrigation as often as possible. Rapid destruction of corneal nerve endings gave relief from pain, and this sometimes resulted in patients seeking advice too late. Sometimes tension was present without pain, and the relief of this was brought about by a slow evacuation of the anterior chamber. The purulent material should not be pulled out forcibly by means of forceps. He advocated an incision thru the base of the ulcer.

Col. H. Herbert spoke from a large Indian experience in cases of this sort which had been neglected before he saw them. It was important, as a primary measure, to clear the conjunctiva of organisms, preferably by a daily washing out with perchloride. He also favored cauterization of the ulcer, especially the margins.

Mr. Christie Reid said he had given up the use of the cautery for these cases. If pure carbolic did not cause healing, he did section. He pleaded that these cases ought to be incised earlier than was usual.

Major R. E. Wright spoke from a large experience of these cases in India. He considered that tension was the key to the riddle of treatment; for in adults ulcus serpens did not respond to treatment unless tension was controlled. In extensive cases he preferred the use of pure carbolic. Intravenous use of iodin was useful in his hands.

Mr. A. L. Whitehead said that in a large practice among industrial cases he found there were about five cases in males to one female. To the more superficial cases pure carbolic was applied, and for the deeper ones, the galvanocautery. The associated conjunctivitis was treated with 10% to 25% argyrol drops. He urged the necessity of getting some form of eye protection, as the total number of these cases was serious, both from the standpoint of health and economically.

Sir Arnold Lawson deprecated the use of salts of zinc. He favored frequent and thoro irrigation. He preferred the electric cautery to carbolic. Hypopyon ulcer in children was more amenable to treatment than the condition in adults.

Dr. J. Rowan favored using a dull cautery direct to the ulcer, followed by paracentesis. He agreed as to the seriousness of these cases in coal miners.

Dr. Hugh Jones spoke of the plan of entering a Graefe knife at the limbus, and extending it until it just overlapped the margin of the ulcer. It was devised by Mr. Richard Williams.

H. Dickinson,
Reporter.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

June, 1927.

Dr. P. M. Farrington, Presiding.

Synchysis Scintillans.

Dr. M. B. Seligstein presented F. M., aged 81 years, who on May 23, 1927, complained of weak eyes and shortsightedness for past four years. Vision O. D. 20/50 J. No. 8; O. S. 20/50 J. No. 8.

Examination of fundus revealed many cholesterin crystals in the vitreous of right eye. Lesions were seen best with a +10. Sph. Opacities resembled a snowstorm when the eye was rotated. The fundus of the left eye was normal. No opacities were seen.

Discussion. Dr. P. M. Lewis had not seen many of these cases. He called attention to the fact that the crystals were cholesterin.

Intraocular Foreign Body.

Dr. Ellett presented I. J., aged 22 years, who was struck in the left eye by a piece of steel two years ago, since which time he had been practically blind in the eye. The right eye was injured by a piece of wood in Febru-

ary, 1927, since when vision had been lost in that eye. The left eye showed a mature cataract with a brown stripe across the lens at the junction of the middle and upper thirds. There was a small corneal scar at the limbus at 8 o'clock, but no visible wound of the iris. The pupil was fixed and the details of the iris were clear. Roentgen ray showed a foreign body in the lens. The use of a magnet was negative, and the lens extracted with iridectomy. No trace of foreign body was found in it. The eye was not yet well, but vision was 15/200 in spite of considerable membraneous cataract.

Discussion. Dr. P. M. Lewis noticed an atropin reaction of the conjunctiva and asked Dr. Ellett what he used if atropin had to be stopped.

Dr. Ellett (closing) said that the patient called his attention to the fact that he was sensitive to atropin. He had not used atropin since he was under his care. He had used scopolamin and duboisine. He said that atropin could be used in ointment when it could not be used in solution.

Chronic Trachoma in a Colored Woman.

Dr. W. Likely Simpson presented J. P., colored, who went to his office in October, 1920, with a history of sore eyes practically all her life. At that time the conjunctiva was thick, scarred and granular. There was much scarring of the cornea and a well marked pannus of the upper one-third of the cornea, especially of the left eye.

The eyes had been treated off and on for the last seven years. The vision was about 20/70 O. U.

High Myopia and Chronic Glaucoma.

Dr. P. M. Lewis presented L. M., colored, female, aged 40, who was seen in the clinic of the Memphis Eye and Ear Hospital on May 24, 1927. She gave a history of being nearsighted all her life and had worn glasses for 20 years. Vision had become much worse during the past year and headaches had become severe lately. Vision with best correcting lenses: O. D. —9.50 Sph.⊖—1.50 Cyl. Ax. 180°=20/200, O. S. —10 Sph.⊖—1.50 Cyl. Ax. 10° =10/200. Pupils were dilated, but reacted fairly well. Tension seemed high by palpation and was found to be 40 in each eye (Schiötz). Fundus examination revealed considerable atrophy of choroid, retina and papillae, the last being moderately excavated.

Fields showed usual nasal contraction.

Treatment: Pilocarpin hydrochloride 2% was ordered every two hours. This promptly brought down the tension and relieved the headaches. Tension taken on May 31, 1927, and on June 10, 1927, when patient was last examined, was found to be O. D. 16, O. S. 20 (Schiötz).

Comment: This patient was presented for two reasons: first, high myopia is supposed to be quite rare in negroes, and second, glaucoma is rather rare in high myopia.

Discussion. Dr. Seligstein had a case of myopia with chronic simple glaucoma. The tension had come down since operation.

Late Infection Following a Trephine Operation.

Dr. P. M. Lewis presented J. P., colored, male, aged 60, who was first seen in the clinic of the Memphis Eye and Ear Hospital on September 7, 1926. He had a typical chronic simple glaucoma, with complete loss of nasal fields and vision reduced to fingers right eye and 5/200 left. The tension was from 40 to 45 in both eyes (Schiötz). The papillae were atrophied and showed 5 or 6 diopters of cupping. On September 10, 1926, a bilateral trephine operation was performed by the usual technic. He did nicely after operation and left the hospital on the eighth day with his tension normal and his eyes quiet. He was seen in the clinic several times following this, the last date being October 26, when his eyes were in good condition. He was then using weak sulphate of zinc drops daily in both eyes.

Nothing more was heard or seen of this man until May 24, 1927, when he reported again at the eye clinic with a panophthalmitis of the left eye. He said that his eyes had been doing well until about twelve days previously,

when the left eye began to "get red and matter."

Pain started ten days ago and for the past week had been severe. The eye was eviscerated that afternoon by one of the housemen and pus found thruout the vitreous.

The loss of the eye apparently resulted from an acute conjunctivitis arising in an eye which had been trephined over nine months before. A number of these late infections of trephined eyes have been reported, but they are fortunately rare, hence the report of this case.

Anophthalmos.

DR. A. C. LEWIS reported the case of a negro boy, aged 8 days. The mother was well and strong, had a negative Wassermann, no miscarriages and three living healthy children.

The baby was apparently perfect in every detail with exception of the eyes.

The orbital cavities were slightly contracted and the palpebral fissures narrow, but the eyelids and even the lashes were perfectly formed. No trace of an eyeball was either visible or could be found by palpation in either orbit.

DR. ELLETT said that some trace of eye was usually found. It is due to failure of primary optic vesicle to bud out.

Oculomotor Paresis Following Erysipelas.

DR. A. C. LEWIS reported the case of D. H., aged 38, a refugee from the Arkansas flood district, who was sent to the Isolation Hospital here in April, 1927, with erysipelas of the right side of the face and head. Patient said erysipelas started on March 25, 1927. Three days later his right eye became inflamed and closed so that he could not open it. Examination showed complete ptosis, acute conjunctivitis with scanty mucopurulent discharge and pupil widely dilated and immovable. Patient could not rotate eye up or in, and only slightly down or out. External rotation was normal. Paralysis of accommodation was also present.

Besides the erysipelas, they found he had a 4 plus blood Wassermann; a very foul mouth with rotten teeth, pyorrhea and Vincent's disease. Koch-Weeks bacillus was found in the eye secretions.

He returned to his home in Arkansas two weeks after admission with no improvement in paralysis.

Refractive Changes in Diabetes Mellitus.

DR. R. O. RYCHENER presented Mrs. G. B., aged 47, who consulted Dr. Henry Rudner on January 6, 1927, because of obesity. Her weight at this time was 203, blood pressure 180/100 and urinary sugar 4 plus. She was placed on a restricted diabetic diet without insulin. She was wearing at this time an optician's prescription: O. U. for distance +.50 Sph., for near +2.25 Sph., obtained August 10, 1926, and apparently satisfactory.

On January 15, she had a sudden visual disturbance and found herself unable to see with her glasses for either distance or near. She returned to the optician who gave her O. U., for distance, +2.25 Sph., for near, +4.25 Sph.

This did not prove satisfactory, and Dr. Rudner referred her to Dr. Ellett, who saw her on January 25, at which time her vision and refraction were:
O. D. 8/200 and J-20; accepted +3.25 S. with +.75 Cyl. Ax. 180°=20/20.
O. S. 6/200 and J-20; accepted +3.50 S. =20/20.
Addition of +2.00 S. gave J-1 at 37 cm. in each eye.
Ophthalmoscopy was normal.
She was given:

O.D.+3.00 S. +.75 Cyl. Ax. 180°
O.S.+3.25 S.
for distance.
O.D.+5.25 S. +.75 Cyl. Ax. 180°
O.S.+5.50 S.
for near.

February 8, her blood sugar was 0.135, while the urine was free from sugar. February 25, she again had a sudden difficulty in vision with her glasses, but made no complaint and did not return for examination until May 28, when in the absence of Dr. Ellett, Dr. Rychener saw her. By means of diet alone her weight had been reduced twenty-eight pounds, being then 175 pounds. Blood pressure

was 140/84, and she was still free from glycosuria.

Vision and refraction were:

O. D. 20/25 and J-14; accepted +1.50 S. with +.75 Cyl. Ax. 180°=20/20.

O. S. 20/25 and J-14; accepted +1.50 S. with + .25 Cyl. Ax. 180°=20/20.

Addition of +1.75 gave her J-1 at 36 cm. in each eye.

Ophthalmoscopy was again normal.

Prescription was given, for distance:

O. D. +1.25 S. +.75 Cyl. Ax. 180°
O. S. +1.25 S. +.25 Cyl. Ax. 180°
O. D. +3.25 S. +.75 Cyl. Ax. 180°
O. S. +3.25 S. +.25 Cyl. Ax. 180°

June 14th, she reported that the glasses were still satisfactory.

Intraocular Foreign Body.

DR. ELLETT reported a patient, D. S., aged 29, who was seen February, 1917, with history of having been hit in the right eye by a piece of steel two weeks before. The vision was 20/25 and J-10. There was a small scar at the center of the cornea and under this a wound in the anterior lens capsule. The vitreous was clear, lens showed a patch of opacity. About four disc diameters below the disc was an area of choroidal disturbance with a bright spot at the center, which looks like exposed sclera. The Roentgen ray showed a small foreign body back, down and in. The application of the magnet did not cause any disturbance, but after it was used a small black particle was seen in the vitreous with a +12. Sphere. The advice to have this foreign body extracted, which was given him both here and in St. Louis, had been disregarded. There was now a mature cataract in the right eye. Vision p. l., but the eye gave no trouble whatever.

M. B. SELIGSTEIN,
Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Section of Ophthalmology.

MARCH 17, 1927.

DR. EDWARD A. SHUMWAY, Chairman.

Angioid Streaks of the Retina.

DR. J. MILTON GRISCOM presented the details of a case of angioid streaks of the retina in a colored man, aged 68, who had been exhibited before the Section at the March meeting in 1926. The color and distribution of the pigmented lines in the retina conform generally to those which have been previously described by other observers.

In contrast to most of the other cases reported, there was no evidence in either eye of past or present retinal hemorrhages or of any choroidal disease. The patient exhibited an irregular, slate colored pigmentation on the skin of the forehead, which had been diagnosed as probable chloasma. The explanation as to the formation of these streaks, as given by various writers, was discussed. Dr. Griscom suggested a possible common cause for the pigment proliferation on the skin and the pigmented streaks in the retina.

Discussion. DR. WM. ZENTMAYER said he thought the regression changes noted in this case suggest a hemorrhagic origin for the pigment.

DR. G. E. DE SCHWEINITZ, after a brief reference to various types of striae in the retina, including angioid streaks, and some remarks on early publications which relate to the latter affection, exhibited three water colors which portrayed in typical manner the lesions of this retinal manifestation, and which had served to illustrate an article published in 1895. The patients were brothers.

This observation and others of similar character in the literature indicate, he said, that angioid streaks, in some instances, may be regarded as a familial affection.

None of the explanations of the origin of these streaks, as Lederer, Fuchs and other observers have stated, are entirely satisfactory, and altho the streaks are probably essentially due to hemorrhages variously disposed, it appears to be definitely true that there are several different types of this disorder. For instance, in one type the streaks ultimately disappear, sometimes after long periods of time, as Dr. Zentmayer had demonstrated, and sometimes in a comparatively short period—two years, as in a case reported by Ascher. Again, gross macular changes—hemorrhages and exudations—may be an early and associated manifestation, or, as Coppez and Danis have noted, exudative macular retinitis may constitute a terminal stage.

Dr. de Schweinitz expressed the opinion that a careful analysis of all reported cases, whereby the various types and their relation to other retinal disorders could be established, as well as the evolution, course and termination of the lesion of this affection, would constitute a valuable research.

Dr. Wm. Zentmayer showed a case of angioid streaks which he first showed at the Section eighteen years ago. He had been shown on two other occasions.

In the right eye the pigment zone about the disc had almost completely disappeared. One stripe fairly characteristic but very pale follows the course of the superior temporal vessel. Elsewhere in the fundus are seen short streaks, sections of former streaks, one gray in color, one terminating in a white band. At the fovea are oblong dense black pigment masses about 1 dd. in size.

In the left eye the pigment masses at the macula are larger and denser than in the right eye. There is one brownish streak running for some distance from the upper margin of the disc. A second short section of a streak is present near the equator.

In both eyes there is sclerosis of the choroidal vessels. Both discs are yellowish and the periphery of the fundus shows the yellow and black flecking originally seen.

No recent changes are noted in either eye.

Congenital Syphilitic Chorioretinitis.

Dr. Jonas S. Friedenwald reported the result of the histologic examination of the eyes of 91 infants either stillborn or dying shortly after birth. Among these, 17 infants were found to be syphilitic, and of the 17, three showed choroidal and retinal changes attributable to the infection. The lesions were of several types: 1. Small circumscribed chorioretinal scars. 2. Diffuse infiltration of the choroid of myeloid cells. 3. Diffuse interstitial scarring of the choroid. This was regarded as a late stage of the same process as presented in 2. 4. Diffuse neuroretinitis.

The relation of these pathologic findings to the familiar ophthalmoscopic picture of congenital syphilitic chorioretinitis was discussed, as was also the significance of the myeloid cells in chorioretinal lesions.

Discussion. Dr. Francis Heed Adler asked Dr. Friedenwald whether he had noticed any tendency of the lesions in syphilitic fetal eyes to be grouped in the anterior segment of the globe. Igersheimer has pointed out that the characteristic lesions of ocular syphilis are an interstitial keratitis and an anterior choroiditis.

Igersheimer was not able to explain why the lesions were nearly always in the anterior segment of the globe, but it would appear from Dr. Friedenwald's slides that the posterior segment could also be involved in fetal life.

Foreign Protein.

Dr. Hunter W. Scarlett briefly reviewed the literature showing that the use of foreign protein is by no means new, dating as far back as 1904, when Darier started his experiments with diphtheria antitoxin.

Experimentally, no definite conclusion as to the value of foreign protein in ocular infections in animals was arrived at, which could compare with the success which had been attained in treating humans.

Thirteen cases in all were treated, ten of which were iritis. Three of the latter were complicated by foci of infection, and, altho they responded favorably to foreign protein injections, did not entirely recover until every focus had been eradicated. The remaining seven cases of iritis, all of which were severe, recovered quickly, cutting down the convalescing period to an average of fourteen days.

The most striking feature in all the cases treated with foreign protein, especially those of iritis, was the rapid relief from pain. One patient said the pain disappeared within one hour.

The conclusions were: (1) That foreign protein was a valuable adjunct in treating ocular infections, but was not a "cure-all," and should never be used to the exclusion of the routine methods. (2) In our cases, especially those of iritis, we felt that the convalescing period was materially shortened, and the severity of the symptoms markedly lessened. (3) Of the foreign proteins used, horse serum gave the most marked reaction and

also the quickest relief from symptoms. (4) All foci of infection should be removed. (5) In our experiments on rabbits' eyes, no benefit from the use of foreign protein was detected.

Discussion. DR. EDWARD SHUMWAY asked Dr. Scarlett in what doses he had used the injections of aolan. He had tried it in several instances and thought he had gotten very good effect, especially in a case of bad iridocyclitis following cataract extraction. In this case he had first used an injection of horse serum, and, on giving 10 c.c. of the aolan, very sharp reactions were produced, with rise in temperature and general disturbance.

DR. SCARLETT in answering Dr. Shumway's question about dosage, stated that 5 c.c. doses were used intramuscularly.

Trachoma Among the Indians of the Southwest.

DR. W. C. POSEY gave a short account of a trip which Dr. Proctor, of Boston, and he, as part of a committee appointed by the American Medical Association to confer with the Department of the Interior, had made in the Southwest to study the spread of trachoma among the Indians. An inspection of the chief schools, hospitals, and villages in that region showed that Indians everywhere, both adults and children, were affected, all stages of trachoma being observed. The physicians of the Indian Service, with whom they came in contact, seemed familiar with the disease and no cases of mistaken diagnosis were observed. For the most part, the disease was treated conservatively and well. Dr. Posey thought that, notwithstanding the excellent sanitary conditions of the schools which were visited, perhaps the main cause of the more rapid spread of the disease in recent years has been the failure to separate children in the schools with trachoma from those unaffected with the disease, and he commended very highly the recent order of the Government to segregate all trachomatous children hereafter in separate schools. The establishment of a trachomatous hospital school for this purpose at Fort Defiance, Arizona, initiates this movement. Pupils will be kept under close surveillance here, treated for trachoma, and receive as much educational and vocational training as their ocular condition warrants. Other institutions of a similar nature will probably be established thruout the Indian region.

Dr. Posey spoke of the conditions attending the treatment of adult Indians; their life upon the plains, where they are exposed to the severity of the weather, exacerbates the disease. Their belief in the spiritual as well as in the healing powers of their "medicine men" often cause them to neglect medical advice. Their cabins are usually unsanitary. Until living conditions are improved, trachoma will surely thrive.

Dr. Posey deprecated socalled "clean up" campaigns, insisting that after treatment is just as essential as primary measures. Tarsectomy should be reserved for the later stages of the disease, the earlier being treated by expression, mild grattage, and by astringents—never by radical surgical procedures. A series of hospitals should be established for the treatment of eye diseases which should be easy of access, with ample provision for indoor treatment. Efforts should be made to teach adult Indians proper methods of living by the establishment of community centers where they may be taught, by those who speak their own language, methods of personal hygiene. Graduates of the Indian schools could be utilized for this purpose. Not until the Indians have adopted the standards of the whites will trachoma be eradicated.

LEIGHTON F. APPLEMAN,
Clerk.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Section of Ophthalmology.

February 11, 1927.

DR. JOHN L. SHELLMAN, President.

Retinal Hemorrhage in the Newborn.

DR. KENNETH PHELPS read a paper on this subject.

Discussion. DR. PAUL BERRISFORD stated that there may be an analogy in the production of retinal hemorrhages in the newborn and the production of retinal hemorrhages in traumatic asphyxia of the adult. The speaker reported in detail one case of the latter.

In traumatic asphyxia in the adult, due to traumatic pressure exerted on the thorax, there results a venous stasis of the head, chest, and upper extremities which may be productive of hemorrhages of the retina and elsewhere, e.g., tympanic membranes, conjunctivae, etc. So, too, during childbirth the newborn may be subject to extreme pressure during its passage thru the parturient canal, giving rise to traumatic asphyxia.

Whether or not retinal hemorrhages of the newborn arise from traumatic asphyxia, they are not of accidental or spontaneous origin.

Dr. Douglas Wood stated that at the State School for the Blind, there were a great many children with eyes that were amblyopic without any apparent causes and he thought it might be due to hemorrhage at birth.

Dr. Fuchs had noted in like cases histories of hard, tedious labor, that might have caused circulatory disturbances within the child's skull. The constriction of the umbilical cord during labor was another cause.

Dr. J. S. Macnie asked if all were hyperopic.

Dr. H. McI. Morton asked if Dr. Phelps had been able to determine in what layer of the retina the hemorrhages were located.

Dr. J. S. Reynolds asked what the blood Wassermann showed in these mothers, and what application that might have to the condition.

Dr. Phelps (in closing) stated that asphyxia as a cause had proved unimportant, as the percentage of hemorrhage was higher in the normal labors than in those that had asphyxia.

These eyes appeared hyperopic with the ophthalmoscope.

The thirty pairs of eyes of which he had examined sections had shown no hemorrhages. One writer who had examined 37 pairs of eyes, thought that the hemorrhage was in the ganglion layer.

Ophthalmoscopically, the hemorrhages appeared to be superficial and seemed to absorb very quickly.

The Wassermann was negative in all the mothers of these babies.

Refraction.

Dr. W. W. Lewis read a paper on this subject. See p. 506.

Discussion. Dr. John F. Fulton stated that Schwenk, in analyzing 21,812 eye patients, found that 81.7 per cent appeared for correction of their ametropia, and of that number 440 refused the use of mydriatics. Low refractive errors should never be corrected unless they produce symptoms, but physiologic hyperopic astigmatism and hyperopia require careful consideration. Refractive errors, like muscular imbalance, should always be remedied when they become a source of annoyance to the patient. The degree of trouble along these lines has nothing whatever to do with the severity of the symptoms.

Cycloplegics are not always necessary. When the manifest correction produces normal vision in an asthenopia patient, as a rule cycloplegics are not necessary, but with the vast majority of cases, they are essential to success. This method substitutes knowledge for guess work, demonstrates frequently that glasses are unnecessary, and enables one to report more intelligently to the consultant whether or not eyestrain is producing the symptoms.

He had never noticed any harm coming from the use of mydriatics. Some cases had been reported of paralysis of accommodation remaining, but careful investigation had always demonstrated that this was due to some other causes.

In cases of obstinate spasm of accommodation in which, many times, hyperopic eyes appear to be myopic, Dr. Fulton felt that nothing takes the place of atropin, which should be continued until the spasm is completely controlled, and then glasses prescribed while the eye is still under the influence of the atropin. This is the only way to give relief to this very annoying condition. It is rarely ever necessary to use mydriatics after fifty years of age; and never after sixty.

In regard to myopias, he always gave full correction, being extremely careful never to overcorrect. A very interesting contest is going on now as to the merits of correcting high degrees of myopia, as to which brings about the best results—correcting the condition by glasses or by removal of the lens. Statistics now being care-

fully compiled point strongly in favor of the latter.

Refractive conditions of the eye change so frequently from many causes that all cases should be re-examined in never less than two years, and in myopias more frequently. No matter what the age, the accommodation of each eye should be carefully measured separately. In that most interesting condition known as senile myopia, the change sometimes takes place only in one eye.

In cases of presbyopia with a pronounced exophoria for near, the prism, base in, can be associated with the sphere with decided advantage.

Cataract will usually be found starting as a thin opacification at the lower internal quadrant of the lens, and by application of local hygienic and systemic treatment and carefully investigating the cause and removing it, this condition can be cleared up in many cases.

When one has thoroly mastered retinoscopy and has a large clientele at his disposal so as to keep in constant practice, it is unquestionably the most accurate test that is at our disposal.

The ophthalmometer is a most useful instrument in the office of the refractionist in the way of measuring accurately corneal astigmatism.

The variations of muscles at different sittings taken under the same circumstances and with the same apparatus was one of his most grievous troubles with patients, and when this was associated with hyperphoria he found that it was more stable when the hyperphoria was corrected with prismatic adjustments. One patient who had ten degrees of hyperphoria, makes her living at china painting and decorative work. She has worn correction for this with a great degree of comfort.

He had found near accommodation differences in the two eyes frequently not only in adults but also in children and made these tests routinely.

He had not been accustomed to use homatropin for the 24-hour period. Even if homatropin was crowded in 5-minute periods for an hour, he could not reconcile himself to the notion that the pupil was relaxed. He thought it required at least 1½ hours before the eye was relaxed.

He had used a very weak solution of homatropin in the eyes of a patient 72 years of age and got very good results where it was impossible to do a refraction otherwise, and he had never seen any ill effects from the drug when followed promptly by pilocarpin drops.

Dr. R. O. Leavenworth stated that for quite a few years he had been using Dr. Lewis' method of overnight cycloplegia. Before that he had used homatropin, 6 minims spread over 1½ hours, and with that method he had had trouble in occasional cases in picking an axis absolutely. Since using Dr. Lewis' method his results were quite different. He believed they would accept the full cylinder and that if the full cylinder is determined with full cycloplegia one would have no trouble with those cases where it is necessary to cut into the minus to obtain good distant vision.

Dr. H. J. Rothschild believed that Dr. Tilderquist had read a paper before the Academy, on refraction about seven or eight years ago, and in that paper had brought out two tables, one showing the amount of correction at first "glassing" that would be accepted by patients with myopia, and the other, the amount of correction that would be worn at first "glassing" in hyperopia. The myopic patient will accept 100 per cent of the correction under cycloplegia at the age of 10. The line then goes down until at the age of 35 they accept practically no correction for near. With hyperopia, at the age of 5 they accept 80 per cent, at the age of 30 they will accept about 90 per cent, and at the age of 60 they will accept nearly 100 per cent.

Dr. Douglas Wood said he did not consider refraction complete without an examination of the muscles, for far and near, as well as examination of the fundus. He advised the indirect method first, followed by the direct. He said the ophthalmometer had been a great help to him and could not understand why and how Dr. Lewis could put a minus glass on an individual with hyperopia. He said he always hesitated to cut a cylinder; but he did

cut a sphere in exophoria, in higher degrees.

Dr. Lewis (in closing) said he seldom ever thought of giving a cycloplegic to any one over 45 unless the patient was myopic and had had repeated refractions with little or no relief. He very often added prism pasters for close work for, of course, one could not give prisms, for near work only, in bifocal Kryptok lenses.

Regarding the use of homatropin over night, he had proved many times to his satisfaction that this took the place of atropin in young adults. He said McNabb had contended that if one took several hours in getting homatropin cycloplegia, atropin would not be necessary, and Dr. Lewis felt this was right. The idea is that you cannot get rapid full mydriasis with homatropin by the socalled "railroad" method. It takes hours for the iris to dilate and empty its blood vessels and likewise you cannot get full cycloplegia where you cannot get full relaxation in the ciliary body.

He gave homatropin to a 22-year-old girl to use at home the night before refraction. At about 4 o'clock the next morning he was called and told that the patient had been suffering from pain in the eyes since midnight. He saw her before breakfast and her eyes were stony hard and steamy and she could see only light and shadows. He immediately took her in his car, got a nurse, and after using hot applications and eserin for several hours he succeeded in getting the tension down. He had reported this case and it was published in the American Journal of Ophthalmology, V. 5, p. 540, July, 1922.

Ordinarily after atropin, if one gets glasses on right away, there is no trouble with spasm. He had seen patients, however, recover from atropin and go right into spasm again. Those patients, even under atropin, who have, according to your retinoscopy, a cylinder of 1½ to 1¾, when you correct them at the trial case, will cut the cylinder down to 75 but finally, after spasm is overcome, they will accept the full cylinder.

In the great majority of cases full cycloplegia can be obtained only by using homatropin over night.

He warned against retinoscopy with cylinders alone stating that if one undertook retinoscopy with cylinders alone and happened to get a large cylinder five or ten degrees off axis, the reading would be entirely wrong. The safest way was to neutralize the first meridian with a sphere, and by putting a plus cylinder on top of that, and working it back and forth, very soon one would be able to tell the exact axis and cylinder strength.

In regard to the remarks about 15 degrees or more of exophoria for near reading, he had mentioned 15 degrees merely as an example of what would be a very serious matter to miss. As a matter of fact, 8 degrees of exophoria at reading distance will cause a lot of trouble. High degrees are very often missed unless one is watching for it. In hyperopia the use of prisms, even in small or moderate amounts, brings us our best results in prism work.

Lately he had been doing graduated tenotomies on the superior rectus muscle in hyperphoria cases and had been getting wonderful results. Knapp had pointed out that when you left, undisturbed, the fan shaped fibers of insertion, the smallest degrees of lengthening could be accomplished. On the other hand, Dr. Lewis felt that it is very easy, in tenotomies, where there is a little deviation in a second direction, to sever the fan shaped tendon fibers on the side that you want to weaken most of the muscle pull; for by severing only the fan shaped fibers on that side of the insertion one could get the desired slight deviation to the opposite side. The graduated tenotomy brought out by Dr. Todd several years ago was a very valuable procedure. One could nick the muscle on one side, then the other, and stretch it out a little bit. In fact, one could do nearly anything one wanted in these graduated tenotomies. With small degrees of hyperphoria, he felt that prisms did very well.

He knew of nothing which gave better satisfaction than the correction of low degrees of myopic astigmatism; those often considered to be of no consequence at all; for instance, ¼ or ½ a diopter, where the patient often had 10/10 or normal vision without any lens.

One must remember the saying that "myopes see more with the brain than with the eyes" holds very good. They figure things out, not because they see the details plainly, but by reasoning out differences in association and comparison.

Dr. Morton's statements about the lenses that filter out different parts of the spectral rays are true.

The prescribing of the Crookes lens, or other lenses that are made for filtering out rays, is not a good idea for indoor work. He had prescribed them for the automobile driver who faces the glare of the road for hours at a time. Most of the patients who have worn amber colored glasses for long periods have lost their color sense for amber colored objects. He cited the case of a nurse at the hospital who wore amber glasses for two or three years and who was color blind for amber color for months after she took them off.

He did not advocate going into the minus spheres except where the patient was astigmatic and had little or no plus sphere to cut.

He cuts ¼ or ½, and that is about as much as the patients need. It is just over the dead line of zero where he gets the best results; and those patients who are getting a cut of as much as one diopter are probably getting more than they need. They may still be fogged when you give them this low cut, but they will come to accept it very soon. It is in those cases of marked astigmatism where they have no plus spheres to cut that you have to go into the minus spheres but not nearly as far as is apparently manifest at the time. After a few days' use they will relax to a point where ¼ or ½ of the minus sphere added will be plenty.

WALTER E. CAMP,
Recorder.

COLORADO OPHTHALMOLOGICAL SOCIETY.

April 27, 1927.

DR. C. E. WALKER, Presiding.

Diabetic Retinitis.

DR. WM. C. BANE showed Mr. Geo. M., aged 68, formerly a railway engineer. He was first examined April 1, 1927, because of a complaint of inability to read, failing vision for some years with more rapid failure of vision during the past year. He gave a history of diabetes mellitus of several years duration. Vision R. and L. 5/60; no improvement with lenses.

Opthalmoscopic examination showed numerous small white spots in both eyes in the retina in the region of the macula, which had the general appearance of a retinitis circinata. There were also hemorrhages in the retinae of both eyes. The patient had been on an appropriate diet but had not taken insulin. No blood chemistry had as yet been done.

Discussion. DR. MELVILLE BLACK stated that he had recently operated on a cataract and on the following day was informed that the blood sugar determination was 247 milligrams per 100 c.c. The patient made an uneventful and uncomplicated recovery.

DR. J. A. PATTERSON reported a case which before operation was sugar free and following a radical ethmoid, sphenoid and frontal sinus operation sugar was found in the urine. Blood sugar was not estimated. He also reported a case of an impacted bladder stone in which after operation sugar appeared in the urine. Both of these cases were operated on under local anesthesia.

DR. C. E. WALKER mentioned a case of diabetes that he had recently examined which developed a myopia of one and one-half diopters.

DR. JOHN MCCAW reported a case of diabetic coma in a man 26 years of age. Insulin was used and marked amelioration of all symptoms followed. Eventually the patient developed bilateral cataracts. The blood sugar has never been below 200 milligrams and has been as high as 300 milligrams per 100 c.c. Dr. McCaw refused to operate on the case.

DR. WM. C. FINNOFF told of a boy 17 years of age whom he had examined during diabetic coma. The blood sugar was 200 milligrams per 100 c.c. The vessels showed typical lipemic chocolate color, which later became yellow. Large doses of insulin were given and the patient became symptom free.

DR. DONALD H. O'ROURKE stated

that it was the opinion of the opthalmologists and the internists who were studying, in conjunction, all cases of diabetes in the Vienna Clinic, that cases of diabetes with retinitic changes did better on a dietary regime than with the administration of insulin.

Gray Plaque In Fundus.

DR. WM. C. BANE brought Mrs. B. R., aged 52, who complained of poor vision in the right eye during the past three years. Central vision was almost nil. (Failure of vison in this eye occurred suddenly.) Vision with the left eye was 5/60 raised to 5/4 with correcting lens. In the right fundus there was a gray white mottled exudate two and one-half disc diameters in size extending downward and outward from the disc. From the upper margin of the disc there was a gray, slightly curved line ½ mm. in width that extended upward and inward for two disc lengths. There were numerous blood vessels in the whitish area and there were two or three small horizontal hemorrhages above the plaque of plastic exudate.

Hole In the Macula.

DR. WM. C. BANE showed Mr. Chas. H., aged 69, whom he had examined on March 7, 1927. The patient had noticed three days prior to the examination that the vision in his right eye was poor. Vision right eye 3/60, not improved with lenses. Vision left eye 5/10, improved to 5/4 with correcting lens. Central vision with the right eye was poor but the peripheral field good. Pupils were equal and active to light and accommodation.

There was a typical hole in the macula of the right eye which had a deep red center about three millimeters in diameter surrounded by a gray ring one and one-half times the diameter of the disc. The patient has chronic nephritis and high blood pressure. There was no history of injury to the right eye. The left lens contains numerous small gray dots that do not seem to impair the vision.

Discussion. DR. EDWARD JACKSON stated that in some of these cases, the history of trauma is absent. Some cases of myopia and also some cases of retinal disease, such as a cyst, may give this picture. He believed this case had been of an inflammatory nature with exudation with an atrophy following, because this "hole" was larger than the usual case seen with hole in the macula.

Paralysis of the Left External Rectus Muscle.

DR. WM. C. BANE presented Mrs. A. S. F., aged 47, examined Feb. 2, 1927; vision right eye with —1.25 sphere was 5/5, left eye with a —1.50 sphere was 5/6. She gave a history of having had a diplopia in her teens. Ten days previous to the examination she had developed diplopia which proved to be due to paralysis of the left external rectus. There was no history of constitutional disease and the Wassermann reaction was negative. No especial attention had been given to focal infection. The patient was put on a saturated solution of potassium iodide, 15 drops three times daily and 7½ grains of mercury by rectal suppositories each night. Tonight there was decided improvement in the paralysis.

Discussion. DR. GEORGE F. LIBBY reported a case of epidemic encephalitis in a boy 14 years of age. He came for examination on Jan. 14, 1927, saying that two weeks before, he had a vomiting attack which was followed by persistent headache and pain above and behind the left eye, with nausea. He also complained of horizontal diplopia, all day except in the early morning. Vision was normal with or without glasses. Correction of a low amount of hyperopia and astigmatism, and 1° of left hyperphoria, did not relieve the headache. There were 8° of esotropia, which later increased to 12°.

Altho the persistent headache and diplopia suggested encephalitis, especially as the Wassermann reaction was negative, this diagnosis was not established until February 21. Slight elevation of temperature and mild delirium occurred then for the first time. Both pupils were widely dilated and there was binocular optic neuritis. The right optic disc was swollen one diopter and the left, three diopters. On March 25th, the right disc was normal and the left showed less than one diopter of swelling; the pupils were smaller and their light reaction was returning, and the diplopia was considerably less. There had been no recurrence of

fever or delirium, no lethargy at any time, and only moderate malaise.

DONALD H. O'ROURKE,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY.

April 12, 1927.

E. K. ELLIS, M.D., Presiding.

Essential Atrophy of the Iris.

DR. J. G. JENNINGS reported that he had seen a girl, 25 years old, married, who claimed sudden loss of vision in left eye about six months previous, about which she did nothing until recently when her family doctor referred her to the Eye and Ear Infirmary. Examination of the left eye showed an atrophy of the iris which was quite marked, with four well formed colobomas. The disc was cupped slightly and the tension was moderately increased. Vision in the eye was nil. Patient was advised to return for further examination but did not do so.

Tuberculous Choroiditis with Microscopic Examination.

On opening an eye removed for suspected sympathetic uveitis, DR. F. H. VERHOEFF found in the fundus a focus of chorioretinitis such as is commonly seen and often supposed to be due to focal infection. Microscopic examination showed the lesion to be tuberculous. Few eyes of the kind have hitherto been examined microscopically.

He found no signs of focal infection in other parts of the body.

Etiology of Primary Glaucoma.

DR. J. HERBERT WAITE said that the ocular capillary walls and the ciliary epithelium, like other animal membranes, allow the free passage of water and of crystalloids between the fluids which they separate, but they prevent the interchange of molecules as large as those of the blood colloids. Since blood colloids cannot normally escape from the blood stream, they must exert their osmotic pressure to prevent water beng expressed from the blood, and to draw surrounding water into the blood. Consequently, fluid exchange between blood and aqueous appears to be resultant between the physicochemical forces which regulate the semipermeability of the capillary walls and of the ciliary epithelium, the osmotic pressure of the blood colloids, the blood pressure within the ocular capillaries, and the intraocular pressure. It is suggested that the capillaries of the ciliary body carry a blood pressure sufficiently high to overcome the intraocular pressure combined with the osmotic pressure of the blood colloids, thereby giving rise to the aqueous as an ultrafiltrate. It is suggested that the capillaries of the iris and the collateral vessels draining Schlemm's canal carry a blood pressure lower than this critical level, thereby effecting an osmotic reabsorption of aqueous into the blood stream here. With so many variables, it is possible that the formation and reabsorption of aqueous need not progress at a uniform rate.

Primary glaucoma may arise from an imbalance in these forces, whereby fluid inflow is increased, or fluid outflow is decreased, or both, probably taking place as follows:

1. *Increased inflow.* It is suggested that the ciliary epithelium in glaucoma becomes abnormally permeable to all the constituents of the blood. When inflow exceeds the total available outflow, there must be an increased intraocular pressure.

2. *Decreased outflow.* It is suggested that the blood colloids may pass thru the ciliary epithelium in glaucoma. Ferments in the aqueous probably split the colloids into molecules small enough to escape by diffusion into the blood stream. But the blood colloids which are caught within a colloidal framework of the vitreous are probably more shielded from ferment action; hence the vitreous is caused to swell, the anterior chamber is made shallow, and the root of the iris is brought in contact with the pectinate ligament. In this way the surface available for outflow of aqueous is decreased, and the intraocular pressure rises.

3. *Vicious cycle.* Since iris blood drains into the venae vorticosae, an intraocular pressure increased by either method must compress the uveal vessels against the unyielding

sclera, thus raising the blood pressure within the iris capillaries and establishing a higher level at which intraocular fluid exchange can take place.

Word Blindness in Children.

DR. WALTER F. DEARBORN stated that instances of what may properly be described as word blindness or alexia are fortunately rare. There are, however, lesser degrees of this difficulty which are not infrequently observed in children and which may rightly be described as milder forms of the extreme condition. These cases of dyslexia are now roughly and somewhat inaccurately described and classified by teachers as nonreaders. Recent studies are helping us to a better appreciation of the handicaps not only of the word blind but also of these poor readers in school. Skill in reading is so essential to academic advancement that the effect of initial disabilities in reading may often be traced even into college years and into later life.

In order to discover the more specific causes of word blindness we may disregard instances which are complicated by low intelligence, general language difficulties as in foreigners, illness or absence from school at the period when the essentials of reading are taught, poor teaching, and so forth, and confine our attention to children of normal or superior intelligence who have had the best of schooling, but still have signally failed in learning to read.

Word blindness is commonly said to be due to a congenital defect in certain visual memory and association centers of the brain, such as the left angular and supramarginal gyri of the cerebral cortex.

This is not an explanation, but is an example of a bad habit which is commonly observed in neurology, in psychology and in some other sciences, of attributing to heredity what we have not otherwise been able to account for. Instead of explaining anything, this way of disposing of the matter has usually for a time stopped further inquiry. In the case of special reading disabilities, family "trees," like those in the case of the feeble minded, have been described as extending back into the fourth and fifth generations. It is thus made to appear that we have to do with the inheritance of a centrally located blight which impedes the development of association fibers in the appropriate centers of the brain and thus results in the specific disability observed.

As a result of recent observations and examinations of cases of alexia and dyslexia, an alternative explanation may be suggested which has both theoretic and practical significance. My collaborators and myself have noted a number of minor sensory or perceptual defects and motor difficulties, differing in different children, all of which may, however, interfere with their ways of learning to read. These defects may make any method of approach, or method of teaching reading, a little more difficult than it would otherwise be. We have further found that these defects are frequently associated with a certain nervous instability, or, in more objective terms, a lack of proper bringing up and discipline in the home and in the school, so that the traits of character, the incentive or interest sufficient to overcome the above mentioned handicaps, are lacking.

Some of the deviations are in fact altogether normal or at least common enough and cause no difficulties in the majority of children but conspire under the usual requirements of the pedagogy of reading and writing to produce, in the instances under discussion, what are essentially simply faulty habits. These factors are not unlike the initial awkwardness of posture and stroke, which when fixed by habit, make for impossible golfers and tennis players, except that in reading there are certain requirements which predispose the individuals in question to adopt the faulty responses. Our analysis of cases indicate that: (1) left-handedness, or left-eyedness, ambidexterity and the associated reverse or mirror writing; (2) the heterophorias, before they are corrected and minor degrees of this difficulty which are ordinarily not corrected; (3) short auditory and visual memory spans—altho these latter are probably associated symptoms rather than primary causes; (4) early difficulties in articulation (and possibly defects in pitch discrimination, as in monotonia), are ex-

amples of the factors which may predispose to word blindness and to lesser degrees of difficulty in learning to read in the case of children.

That left-handedness or ambidexterity should be connected with difficulties in reading may, at first thought, seem bizarre, altho recognized as factors in the etiology of the related difficulty of mirror or reversed writing. The way in which left-handedness may operate as an initial handicap in reading as it has been shown to operate in writing, is suggested by the following observations. Undoubtedly others of the above named factors are present in most cases. Otherwise we should have difficulty in explaining why all left-handed children do not have trouble in learning to read and only a small fraction of them do! The way in which these other factors reinforce the initial difficulty of handedness, or are themselves the primary causes has been set forth in the description of individual cases of disability in reading. There is space in this abstract of the paper only to point out the possible relation of left-handedness to disability in reading.

If a left-handed boy gets the "feel" of the movement made by his right-handed teacher in writing the word "cat," and starting (as she does) from the center of the body, moves his left hand outward and produces "cat" in reversed script he will be told not to move his hand from the right to left, but from the left towards the right, and that he must watch the teacher and do as she does. He is thus required at the start to disregard his kinesthetic stimuli and imagery, or at least to subordinate them to the visual. If the kinesthetic feelings and memories of movement happen to be his forte (as compared with the visual) he may be doubly injured in the great process of conformity which education is. Instead of the integration of kinesthetic and visual memories which is taking place in his right-handed classmates, he begins with something of a conflict, because, while he may learn to conform in the matter of handwriting, he will follow his inclinations in other activities. The little girl who conforms to requirements in writing and in many other activities may slyly, when not under the watchful eye of parent or teacher, shift the needle into her left hand for sewing. When a left-handed boy draws a train of cars or a donkey going into a barn, no one objects to his engine or his donkey facing towards his right. He will naturally draw them this way, if, as is natural, he starts with the donkey's head and finishes with its tail, because his hand will thus not obstruct his view during the operation. The right-handed boy or girl will usually face these objects towards his or her left hand for the same reasons. But when the left-handed boy begins to write he must "push" his hand in a direction which covers what he has written, or adopt a position for holding his pencil which is not the correct one, and which seems and is, indeed, awkward both from his standpoint and that of the observer. This may not appear a very serious matter, but it is of the nature of an initial handicap.

The outgoing movement of the left hand is from the center of the body towards the left. The left-handed person, possibly because he watches what his preferred hand does and thus establishes the habit, may show a preference for this same direction in his eye movements. The reading of "saw" as "was" is a very commonly observed error, altho it is not confined to the left-handed. In tachistoscopic experiments there is a tendency for the left-handed to catch the end letters of the words first, just as the right-handed commonly get the initial letters first. The reading of "when" as "now" would seem quite unintelligible except as one had observed this tendency. The confusion of letters which are the same in form but different in position, such as p, g; d, b; n, w; has been explained as due to the fact that our earliest memories of letters may be muscular. The eye movements may be quite as important as hand movements in fixing these memories.

W. Holbrook Lowell,
Recorder.

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INJURIES TO THE EYE BY LIGHT.

As light came to be understood, it was found that there were other radiations from the sun, similar to light in many ways, but not able to produce the sensation of sight. On the one side these invisible radiations were called ultraviolet, actinic, or chemical rays; on the other side are found the infrared, or heat rays. As these were investigated by students of physics, other radiations were discovered, as the Hertzian rays, and the Roentgen rays. Clerk Maxwell, the mathematician, called them all *electromagnetic radiations.*

The series of electromagnetic radiations has been studied and their different wave lengths measured, from the shortest x-rays, two or three ten-millionths of a millimeter in length, 0.2 or 0.3 $\mu\mu$, up to the longest waves used in radio broadcasting, measuring thousands of meters. Those that serve the sense of sight have wave lengths of 385 to 780 millimicrons ($\mu\mu$ or mμ); shorter waves 200 to 390 $\mu\mu$ are called ultraviolet; longer waves, 780 $\mu\mu$ and upward, are spoken of as infrared, or heat radiations. It has been difficult to distinguish between the injurious effects of these different radiations; that reach us, mostly intermingled. The experiments of Verhoeff and Bell in 1916 (Proc. American Academy of Arts and Sciences, v. 51, No. 13), however, gave important clues to unravel the confused observations regarding such injuries.

The problem is complicated by the transformation of radiant energy of one wave length into that of another wave length. Thus the invisible ultraviolet radiations, falling on a solution of a quinine salt, are transformed in the superficial layer to blue light, making this layer visible. Other substances can change blue light to yellow or red; or light into heat radiations. In the eye the crystalline lens has this power of changing ultraviolet radiations into light, and the pigmented tissues change light into heat radiations.

By study of the histologic changes produced in the tissues, however, Verhoeff was able to discriminate between the lesions produced by ultraviolet (abiotic) radiations, as he called them, and those caused by heat. On this basis it is possible to classify the injuries to the eye produced by excessive exposure to light and other forms of radiant energy. The long evolution of the eye, fitting it to deal with light

and use it to serve the needs of all sorts of animals, raises the presumption that light, as light, does not injure the eye; altho the harmful effects of heat, produced by the transformation of light into radiations of greater wave length in certain tissues, cannot be excluded; and this view has been supported by experience. We may say that ultraviolet and heat radiations are both "abiotic," opposed to the normal life of tissues of the eye; and are dangerous because of their close association with light.

Snow Blindness. The danger to sight from prolonged exposure to bright sunlight and its reflection from the snow, at high altitudes and in the polar regions has long been known. In the form dreaded by Arctic explorers, there is disturbance of color vision and of retinal light adaptation, so that the sufferer becomes quite blind when the light is reduced in the evening, and later he cannot see even in the strong light. This seemed to be caused by the prolonged action of strong light on the retina. It was produced experimentally by Verhoeff and Bell by concentrated sunlight, or artificial light, when heat radiations and ultraviolet radiations have been excluded. They also noticed such effects in monkeys and in the human eye. But the impairment of vision is quickly recovered from, and no perceptible pathologic changes are left in the eye.

A different condition, also called *snow blindness,* is produced by exposure to ultraviolet radiations of the sun; and is called *electric ophthalmia,* when caused by exposure to ultraviolet radiations from arc lights or in the process of welding. Experimentally, it is produced when only ultraviolet radiations fall on the eye and both light and heat radiations are excluded. In this condition, the lesions, which are more or less permanent, are produced in the superficial layers of the cornea, in which the ultraviolet radiations penetrate and are largely absorbed. In these cases symptoms may not be noticed until several hours after the exposure. Then acute pain begins. The corneal epithelium is damaged and cast off, minute points are left that stain with fluorescein; polymorphonuclear leucocytes invade the cornea, the corneal corpuscles and lamellae are markedly affected, the endothelium may be cast off and the cells only slowly replaced, vessels advance from the limbus into the cornea and only disappear after several weeks; and some haziness of the cornea may remain for a long time.

Sun Burn of the Conjunctiva is generally seen in cases of acute corneal lesions produced by ultraviolet radiations, and sometimes from prolonged exposure to the sun, especially in the early spring. The changes in the epithelium resemble those produced on the cornea. There is hyperemia and sometimes minute hemorrhages, and purulent discharge from the conjunctiva. These symptoms gradually disappear. There are cases of more chronic conjunctival irritation, photophobia and asthenopia that occur chiefly in tropical climates, that may also be ascribed to exposure to solar radiations; but their dependence on this cause has not been well worked out. The same is true of the socalled vernal conjunctivitis and xeroderma pigmentosa. It is not unlikely that a peculiar sensitiveness to abiotic radiations may be an important factor in the production of these diseases; but our knowledge regarding them is still too incomplete to allow their definite classification with ocular injuries due to light.

Injuries to the Crystalline Lens by ultraviolet radiations are very unlikely. Experiment shows that of such radiations falling on the cornea only 1/18th pass thru it to the aqueous. The lens injuries produced by radiant energy are due to heat. Verhoeff found that they corresponded to the effects of heat; and were found in the superficial portions of the lens most closely in contact with the iris, in which heat was produced by the transformation of light. Glass blowers' cataract may be due to the effects of heat on the eyeball and body in general; and while senile cataract has been ascribed to the effects of light and heat, there is more evidence to show that it depends rather

on chemic changes that may be influenced by diet. The cataract that follows lightning stroke, seems to depend on the actual passage of the electric current thru the tissues of the body.

Lesions of the Uveal Tract are clearly those of heat. The pigmented tissue of the iris and choroid has great capacity for changing light and other shorter wave radiations into heat; and the lesions found in these tissues resemble those produced by heat alone. Cell proliferation is stimulated, hyperemia, swelling and small hemorrhages occur; and the effect is markedly greater in the pigmented than in the albinotic iris. It is probable that choroidal scars and vitreous opacities, that are sometimes found after electric ophthalmia, from welding and short circuit exposures are of similar origin.

Retinal Injuries, Eclipse Blinding, are probably due to the effects of heat produced in the pigment layer of the retina and in the choroid. They include the temporary impairment of vision and erythropsia, and more lasting injuries produced by heat. The former are followed by recovery, which may be complete in a few hours, or only after many months. The latter may be entirely permanent, with central scotoma, metamorphopsia and visible scarring. Seen early they show exudation, hemorrhage and cell proliferation.

The important thing to be done for lesions due to light and associated radiations is to prevent them. When they occur, rest for the eyes is the first indication and later restoration of function by gradual return to normal conditions of stimulation by radiant energy. The use of protective glasses is a large subject by itself, of more interest in connection with chronic forms of asthenopia, than for its bearing on the definitely recognized lesions of the eye due to light, heat and chemic radiations. E. J.

GRADUATE COURSES IN OPHTHALMOLOGY.

Of fifty-eight different "conferences" arranged for the Detroit meeting of the American Academy of Ophthalmology and Oto-Laryngology, all but two were held; most of them being given on two or three successive days, and more than half of them being devoted to ophthalmology. The general impression made by this graduate instruction was expressed in the opinion, that if the Fellows of the Academy were forced to do without one or the other, they would rather give up the regular program of papers and discussions, than to lose the opportunities of these conferences.

The thirty ophthalmologists, who demonstrated their abilities as teachers by leading these conferences, are many of them young men who never held teaching positions in any medical college. Their interest in the subjects assigned to them, lead them to study and make the preparation necessary to do well this graduate teaching. Their performance reveals educational resources in the profession hitherto unknown, which, if properly utilized and developed, will notably raise the educational standards of American ophthalmology.

The "Conference" is well suited for graduate teaching. The leader has to study his subject from different points of view, make a general survey of it, choose the collection of facts, or line of thought, by which it can be best introduced; and prepare to guide the discussion, whichever direction it may happen to take. One-half the available time may be given to his presentation of the subject. The remainder is to be taken up in answering questions, or in hearing discussions from members of the class. From a good lecture, he who gives it may learn more than any of his hearers. In a conference the experience and thinking of some members of the class, expressed in questions, or statements of experience, will be as suggestive and instructive to the leader as to any one present.

The conferences at Detroit were a success. The only real complaint heard about them was, that it was not possible to attend all of them that the critics wanted to attend. In three days it was possible to attend only six; and among the thirty subjects were others

that they wished to have. Often the two subjects most desired came at the same hour. The committee in charge had a most difficult task to provide such a mass of instruction to small groups, for the 600 Fellows who wished to profit by it. The meeting demonstrated that such graduate instruction was possible. The next step is to make it available to a larger number of ophthalmologists. To accomplish this there must be cooperation among those who wish to benefit by it.

Any group of 6 to 20 ophthalmologists living in the same city can get such instruction, if they can agree on the subject and the teacher. Paying of the teacher to come to them will cost far less, than for the class to go to him, at some university in America or Europe. Taking two hours a day, for one or two weeks, requires less sacrifice of time than going to London or Vienna, for the weeks or months that will be required to get the same hours of instruction. For nearly all branches of study that the ophthalmologist may want to pursue, the needed apparatus is at hand, or easily transported. Fuchs, Koeppe, Graves and others, have demonstrated in America how courses of university quality may be available in any part of the country. The past summer a lecturer from Vienna gave courses of 6 to 10 hours in a half dozen American cities. For more than ten years the ophthalmologists of two cities of 300,000 in the Western United States have had such courses without leaving their homes. The time has come when continued graduate study should be taken seriously and planned for by every physician, and particularly every specialist who hopes to achieve professional success.

E. J.

THE INTERNATIONAL COUNCIL.

The decision to hold the next International Ophthalmological Congress at Amsterdam in September, 1929, will be noticed by Ophthalmologists, and hailed with satisfaction, thruout the civilized world. But the Conference that accomplished this did something that may prove even more important, when it planned for the International Council to hold office in the period intervening between the Congresses. The twelve members of the Council appointed by the Conference represent as many different nations, and constitute a permanent international body, prepared to consider questions of international ophthalmologic importance that may be remitted to them.

A weak point in the organization of International Ophthalmological Congresses, in the past, has been the lack of any permanent body standing behind them, to promote cooperation and a good understanding between the widely separated centers of ophthalmic interest, during the years that separated the international congresses. This lack of sustained, common interest showed in the membership of the Congresses. When the first Congresses were held in Brussels and Paris the bulk of members came from France and Belgium and Switzerland; few came from other European countries and very few from across the seas. Germans took practically no part in these until a Congress was held in Germany. English speaking ophthalmologists became active in them, and attended in large numbers, when the Congresses were held in London, 1881, and Edinburgh in 1893. The old plan, of choosing at one Congress the committee to organize the next, broke down completely when the great war prevented the gathering of the twelfth Congress in St. Petersburg in August, 1924.

The work of organizing the coming International Congress at Amsterdam is in good hands. The Council represents directly, or by close association, most of the civilized nations and the various languages used by ophthalmic writers and teachers thruout the world. All the ophthalmologists will be interested in the arrangements that will be made for it, and in becoming members of it, when membership lists are opened. The preliminary work for its organization is well started; but will entail a great deal of labor on those

who are carrying it on. It is to be hoped that the financial support needed will be promptly forthcoming.

But the permanent function of such an International Council to consider questions of ophthalmic interest to the profession and the people of all countries, questions of standards and nomenclature, of international customs and laws, of cooperation in literature and education, will more and more be brought to the attention of the Council, and in time may become the more important function. How this phase of its activity is likely to develop may be seen in the history of the Council of British Ophthalmologists, and in the subjects brought before the Washington Congress of 1922 for International consideration. To give support to the International Council is a duty that English speaking ophthalmologists should promptly assume, and the performance of which they can always think of with satisfaction. The largest national group of ophthalmologists in the world, those of the United States, represented in the Council by Dr. de Schweinitz, may well take it upon themselves to lead in this matter.

E. J.

BOOK NOTICES.

La Tuberculosis en los Ojos—(Tuberculosis of the Eye). Semiology, Diagnosis and Treatment, by D. J. Lijo Pavia, of Buenos Aires, Argentina. 1926. Octavo 177 pp. paper. 41 illustrations in text, 6 black and white plates, 5 colored plates.

The wonderful advances of the Western hemisphere for the last generation are nowhere better exemplified than in the publications of the medical men of the Spanish speaking countries of South America, especially of Buenos Aires, who are bringing Argentine medicine to the fore. Sit up and take notice you North Americans, rub up your school time memory of Latin, the root of the Romance languages. Take a little time to acquire a reading knowledge of Spanish, for it is easy reading and much is to come out of this mill, which, like that of the gods, grinds exceedingly fine.

It is to be noted that this work, the results of extensive experience in the Hospitals of Tornu, Alvar, Rivadavia and as Chief Oculist of Medical Schools, shows that the author has found and studied, treated and cured, many instances of tubercular eye affections; and at the same time the foci of tuberculosis in other parts of the body have disappeared. He takes up his subject under the following headings:

1. Tuberculosis of the palpebral and tarsal conjunctiva; which he describes as being diffuse, nodular, ulcerative, vegetative, lupus, and mixed types. Differential diagnosis is shown by the clinical aspects, from other conjunctivitis, and particularly demonstrated by the reaction of the conjunctival lymphatic follicles to the trial doses of tuberculin. This is of diagnostic importance for instance, in 1000 children, 45 to 48% showed positive tubercular ocular reaction; in others at least 25% of children reacted. In 280 tubercular subjects, disseminated tubercular follicles were found in 208 cases; only 72 having normal conjunctiva. 83% of the tubercular patients show ocular tubercular conjunctival disease, a proportion never so noted in our Northern cases; perhaps not diagnosed, and therefore a fit subject for study here. A diagnosis of ocular tuberculosis is not always made in the United States of America. The author's illustrations of microscopic sections certainly show undoubted tubercular tissue and the many cases cited in the context prove its existence.

2. Bulbar, episcleral and scleral tuberculosis; 50 to 90% of the cases of phlyctenular keratitis are of demonstrable tubercular origin.

3. Primary tuberculosis of the cornea is rare, but some cases of interstitial keratitis are certainly tubercular, as shown by their obstinacy to cure by local treatment, and by the negative Wassermans and curability by tuberculin injections. 29 cases of keratitis of various forms due to T.B. are cited in detail.

4. Tuberculosis of the uvea, has been known since 1837 and is recognized by the general run of ophthalmologists.

A number of cases are cited, and shown to the eye of the reader by very well reproduced plates of miscroscopic sections and fundus drawings.

5. The diagnosis is based upon the clinical signs and the local reaction to tuberculin, the general biologic and serologic reactions and from microscopic examinations of excised specimens, proven in some cases by culture of the bacilli.

The treatment is general and local, with specific medication by attenuated tuberculin. Pavia shows that tuberculin is an irritative substance, which destroys the live tubercule bacilli in the body by causing an inflammatory specific allergic reaction, resulting in the disappearance of the local tubercular affection in all parts of the body and the cure of the patient. He commences with T.R., dilution one to 22 or 25 parts, with increasing strength for three or four days, until a dose is reached which is "normal" for the individual. For details we must refer to the original, or to publications on T.R. therapy. The book is highly recommended, as it contains new material well worthy of earnest thought by the ophthalmologists in the United States of America. H. V. W.

The Chiasmic Syndrome, A Clinical, Pathologic and Therapeutic Study by **Albert Favory.** Paper, 184 pages, 65 illustrations. Paris,1926. G. Doin et Cie. 25 Fr.

This book is divided into three parts corresponding to the divisions in the title. Part I, 102 pages, deals with the clinical side, and is discussed in two chapters. Chapter 1, 20 pages, deals with the loss of visual acuity, perimetric examinations, ophthalmoscopic examination, pupillary anomalies and x-ray examination. Chapter 2, 82 pages, discusses the clinical forms under the heads of; tumors, syphilis, multiple sclerosis, encephalitis, traumatic lesions of the posterior sinuses and chiasmic syndrome of toxic origin.

Part II is also subdivided into two chapters. Chapter 1, 42 pages, deals with anatomic features, the topography of the chiasm, relation to the brain and meninges, vascular relations, arrangements of the optic nerve fibers in the chiasm. Chapter 2 describes the method of production of the symptoms, i. e., mechanism of alterations in the visual field, and mechanism of changes in the ophthalmoscopic image.

Part III deals with therapy, in 27 pages, under the heads: (1) Treatment of tumor syndromes (radiotherapy, surgery). (2) Treatment of infectious syndrome. (3) Treatment of syndromes of endocrin origin, and (4) Treatment of syndromes of sinus origin. Two pages of conclusions and 191 references to the literature follow.

Thruout the book there are numerous case reports, illustrating the particular point under discussion, accompanied by charts of visual fields. There are also photographs and drawings, illustrating the anatomic relation of the chiasm, and a few radiographs.

For those who can read French, this book gives an excellent exposition of our knowledge of the chiasmic syndrome, in a relatively small compass. C. L.

Brückner, A. Grundzuge der Brillenlehre für Augenärzte. Erster Band. Paper, Octavo, 159 pages, 53 ill. Berlin: Julius Springer, 1924.

This volume is dedicated to M. von Rohr, whose lectures and advice gave the author the incentive for its preparation. It is intended to give to the ophthalmologist an easily comprehensible, but strictly scientific presentation of the more recent doctrine of eyeglasses; as the great progress made in this field, especially by the elaborate investigation of Gullstrand, renders it essential for the ophthalmologist to gain a better understanding of this intricate subject. The different chapters deal with general dioptrics, the eye and glasses with and without accommodation, vision, astigmatism. A number of problems are added for calculation of position and size of images, magnification thru the loupe, etc. The most important formulas are given in an appendix. Close study of the book will be of value in this direction. C. Z.

Fasiculus Gratulatorius in Honorem K.K.K. Lundsgaard, celebrating his sixtieth birthday, September 13, 1927. By his friends and ophthalmic colleagues. Paper, 310 pages, 8 plates, three in colors, and 73 illustrations in the text. Copenhagen: Levin and Munksgaards, 1927.

This volume constitutes fasiculi 1-3, volume 5, of the *Acta Ophthalmologica,* and was undertaken to celebrate the birthday anniversary of Dr. Lundsgaard by his editorial colleagues, Profs. Fritz Ask of Lund, and Ejler Holm of Copenhagen. The 28 contributors to it are all Scandinavians, altho one of them lives now in South India. The Carolina Medical Institute, of Stockholm, and the Universities of Copenhagen, Helsingfors, Lund and Oslo, are represented.

Under the editorial management of Lundsgaard the *Acta Ophthalmologica* has developed a distinct scientific and literary character; which is well maintained in this volume. It deals largely with the fundamentals, taking up such subjects as: The Oxidation Mechanism of the Crystalline Lens; The Grape Sugar Content of the Vitreous; Experimental Researches on the Corneal Vessels; The Fundamental Relations of an Optic System; the question of the Endocrine Origin of Juvenile Cataract; The Diastolic Pressure in the Central Artery of the Retina; and The Color of Incandescent Bodies.

But the practical subjects are not neglected; the majority of papers deal with them. Among the first half dozen papers we find those devoted to the Light Bath Treatment of Diseases of the Eye; Relation Between Diseases of the Teeth and Eyes; Prognosis of Very High Myopia, and a Special Form of Nasal Hemianopsia. Even classic literature is represented by a paper calling attention to Johannes Franciscus who wrote on the Structure and Color of the Eye in 1556. Names of world wide reputation are included in the list of contributors as: Ask, Bjerrum, Gertz, Gjessing, Gronholm, Holth, Schiötz and Tscherning.

The Scandinavian ophthalmologists show themselves here as scientific, practical and progressive. This personal tribute to Lundsgaard, whose portrait furnishes the frontispiece, is appropriate and all the more forceful, because it has brought together a notable array of scientific observations made by accomplished teachers and writers.

New Oto-Neuro-Ophthalmologic Journal.

Another Spanish special journal, from Buenos Aires, Argentina, makes its bow to Medical men:—

"Revista Oto-Neuro-Oftalmologica y de Cirugia Neurologica," the directors being Dr. J. Lijo Pavia and Dr. Roque Orlando, with a staff of well known South Americans. Dr. Ernesto Dowling is the editorial Secretary. This is a well printed Journal of 68 pages containing an introduction stating the reasons for its birth and its policies.

The first article "La fotografia del fondi de ojo," by Dr. Pavia is very instructive, containing 22 illustrations, eleven of which are well reproduced photographs of the fundus. He uses the Dimmer method with the Gullstrand stationary ophthalmoscope, constructed by Zeiss of Jena, explaining the use of the instrument and the adaptability of ocular fundus photographs for clinical records. This article is to be continued in the next issue. Other essays are on Hemiplegia in Flexion, Postencephalitic Syndrome, Labyrinthitis Circumscripta; ending with several book reviews and abstracts of neurologic articles, mostly relating to the eye and ear.

H. V. W.

Give The People Their Own War Power, Thomas Hall Shastid, M.D., L.L.B., F.A.C.S., etc. Duluth, Minnesota. Cloth, 12 mo. 220 pages, Ann Arbor, Michigan, George Wahr. Publisher.

The readers of this journal know some of the products of Dr. Shastid's active mind, and will be interested in what he has been thinking about along the lines implied by his title. His call, on the title page, begins: "Let us reason then about this worst of all diseases, war (which if unchecked is lia-

ble to destroy civilization itself), and see whether or not there be any cure for it."

In brief, Dr. Shastid proposes no plan for disarmament, no new international machinery; only, that in the United States before a war can be entered upon, a referendum vote shall be taken to ascertain if the people choose war; and that no foreign loans shall be made without such a referendum. Forms are suggested for amendments to the Constitution of the United States, to give effect to such restrictions on governmental action. The greater part of the book is used for presentation of the reasons for such amendments, expressed in the form of questions and answers.

Even in time of war, the work of the medical profession is to prevent suffering and death. During peace, in these days of prophylaxis, it is proper that thought should be given to the prevention of this "worst of all diseases."

E. J.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Duke-Elder, W. Stewart. Nature of the Intraocular Fluids. Supplement to Brit. J. of Ophthal. 1927, April, v. 11, No. 4.

This monograph of some one hundred and forty pages reflects a most exhaustive study of this subject by the investigator. The subject is divided into three parts: first, experimental, second, theoretic; and third, a very complete bibliography. Under the first, the author discusses the general chemical composition of the normal aqueous humor, physical properties of the normal aqueous, and the physical properties of abnormal aqueous. In the second part, the author discusses the theory of membrane equilibria, the physicochemical equilibrium, the plasmoid aqueous, theories of the nature of the intraocular fluids, and the theory of dialysation.

By unifying the work of others found in literature and that of this investigator, a fairly authoritative statement of the physicochemical nature of the intraocular fluids can be deduced. Considering the results in conjunction with those obtained with those obtained by others, and viewing in their light other methods of inquiry and other hypotheses, the author concludes: that the nature of the mechanism of the formation and circulation of the aqueous humor as at present classically accepted and taught is wrong: that the aqueous is neither a secretion, nor in the accepted sense, a transudate from the blood: that it is a dialysate from the capillary plasma, the essential dialysing membrane being the capillary walls: that under normal conditions, while an interchange due to metabolic activity constantly occurs, and an internal thermal current exists, the aqueous humor does not circulate actively thru the eye, but is in equilibrium with the capillary blood: that at the same time, constantly occurring changes of pressure, induced by musclar movements, etc., superimpose upon it secondarily a minimal and intermittent circulation.

D. F. H.

Marx, E. "Crystals" in the Eye. Nederl. Tjdschr. v. Gen. 1927, May 28.

The author gives a short resume of six patients, five of whom had tuberculous iridocyclitis while the sixth patient had diabetes. Clinically glistening points can be observed in the eyes. The source cannot be determined. The tendency exists to call them crystals. With the slit lamp only can they be observed. Even when known to be present they cannot be seen with Hartnack's loupe. One patient showed them in the clear cornea in the parenchyma at different distances

from the epithelium, they disappeared leaving a clear cornea. They also disappeared in a thickened and vascular cornea, which process ended with a large macula. A third showed brilliant points between large Descemet spots. If light effects are seen here, care must be taken that the copper shining endothelium of the cornea, which may have formed the most fantastic folds, is not considered as light reflection due to crystals. The color of these light effects is, however, silvery white. A fourth patient had numerous small and large crystals shining in the deeper as well as in the superficial layers. The patient had tubercules in the iris and in the right eye, secondary glaucoma from numerous posterior synechiae. In a fifth patient with an atrophic eye, a number of glistening spots like crystals are to be seen in different layers of the iris. The sixth patient with diabetes shows in her atrophic iris numerous brilliant spots in the different layers

An iridectomy had to be done on patient four. The sections with the ice-microtome show peculiar strongly light reflecting structureless balls which are entirely round and lie single, with a diameter of 10-20μ, or together producing a slight flattening. Larger agglomerations take a mulberry form. These globules suggest Russell bodies. The specimens stained with eosin and hematoxylin show these formations in a weak blue color, with Van Gieson, stark yellow. Even in partly discolored specimens these globules have still a lemon yellow tint. *Crystals cannot be found either in the stained or unstained sections.*

The light reflexes, which suggest crystals, must be attributed to the presence of these smooth, strongly reflecting globules, which may act as concave and convex mirrors, so that small upright virtual and reversed images originate. The light moving over more than one globule will produce successive reflections of them and reproduce the same effect of light and dark as crystals.

Much is in favor of accepting these globules as Russell bodies: the general form, the absence of structure of these products, the great affinity for acid stains and their strongly reflecting power. Against it is the absence of plasma cells in the iris and nowhere is the origin of these formations from cells demonstrated. Double refraction, as mentioned by some writers of Russell's bodies, is here absent. For confirmation we need more study.

E. E. B.

Neville-Thacker, W. A. Retrobulbar Neuritis with Sinusitis. Brit. J. of Ophthal. 1927, April, v. 11, p. 147.

This is the history of a female, aged 21 years, whose vision was reduced to counting fingers and who had pain on moving the eyeball. There was a central and paracentral scotoma. The edges of the disc were blurred. The maxillary and frontal sinuses were clear by transillumination. About one month following opening the posterior ethmoid and sphenoid, vision improved to 6/15—4. D. F. H.

Löhlein, W. Tension Curve of the Glaucomatous Eye. Klin. M. f. Augenh., 1926, v. 77, p. 1.

Increase of intraoclar tension and its immediate consequences is the most important point in the diagnosis, prognosis and treatment of glaucoma. The author reports the tonometric studies of all (100) cases of primary glaucoma in his clinic during the last one and one-half years. The tonometry was made at 8 and 11 a. m., and at 1, 4 and 7 p. m., always by the same surgeon. In about half of the cases the day curves of tension on two successive days were identical, and there was a parallelism of the curves of both eyes. The most characteristic of the usual curves of the glaucomatous eye is the inclination to high ascents, during the night, chiefly between 5 and 7 a. m. Therefore, in all doubtful cases it is important to take the measures at early morning. If this is not done the influence of pilocarpin is entirely deceptive since in spite of its application in the day the increase of tension in the night is very frequent. Therefore, pilocarpin salve is applied late in the evening with instillation of pilocarpin in the early morning. On account of a possible initial rise of ten-

sion after suprarenin this ought to be applied only by the surgeon. If, after correctly applied treatment with pilocarpin, the tension rises during the night and the function deteriorates, an operation is indicated. If, after operation, the tension rises during the night, Löhlein's experience shows that the eye almost always responds to pilocarpin with decrease of tension which often conquers the nightly increase.

C. Z.

Hughes, E. Nicholas. Locke's Solution and the Cornea. Brit. J. of Ophthal., 1927, April, v. 11, p. 145.

The author finds Locke's solution of great value in treatment of corneal diseases and traumatism. The following is the complete formula:

Sodium Chloride	0.9
Sodium Bicarbonate.....	0.5
Potassium Chloride.....	0.042
Dextrose	0.1
Calcium Chloride.....	0.025
Distilled water sufficient to make	100.

Three case histories are cited all of which showed prompt recovery following its use. One in which failure followed orthodox remedies responded promptly to the use of Locke's solution. The theory of its action is based on the fact that the cornea depends for its nourishment on the lymphatic supply; therefore, a solution of similar content should benefit. The solution should be applied at frequent intervals, every two hours. D. F. H.

Vogt, A. Herpes Febrilis. Schweiz. mediz. Wochenschr, 1927, May 21. Klin. Monatsbl. f. Augenh., 1911, May-June, p. 730.

The author tries to prove that herpes should be considered a constitutional disease as are tuberculosis and lues. They react in a similar way to traumatisms. For accident insurance this leads to the not unimportant conclusion that a corneal herpes, which follows a corneal trauma, in a herpes carrier cannot be considered as solely due to the trauma, but similar to a traumatic joint tuberculosis, i.e., a manifestation of the disease localized by injury to a part.

As convincing evidence, the author describes a corneal traumatism with a hot cinder, which was removed and succeeded three days later by a typical ramified herpes figure. Illustration of this will appear in the second edition of Vogt's atlas of slit lamp microscopy.

The parenchymatous form, which is the common form in rabbits, is much rarer in men. It can be largely prevented by careful curettage of the diseased region, after staining with fluorescein. The author regards this procedure far more reliable than touching with tincture of iodin. The curettage reduces materially the time of disability, usually to a few days and also prevents the serious visual deterioration or at least lessens it.

The author points out that herpes corneae is a disease which may last weeks and months, with a tendency to relapse. This lesion may progress in the middle and deeper parenchyma in the form of a circumscribed parenchymatous keratitis. This keratitis parenchymatosa metaherpetica, now and then showing the picture of Fuchs' disciform keratitis, shows repeatedly recurrences combined with iritis and local formation of precipitates situated behind the opacity, and winds up nearly always with serious permanent disturbance of visual acuity.

The author does not remember having found during the last two years a patient with corneal herpes who does not have from time to time a herpes eruption somewhere else than on the cornea. This appearing of herpes corneae in a herpes carrier is, therefore, nothing accidental. We may conclude from these findings with a certain amount of probability that only herpes carriers will become affected with a corneal herpes.

The author refers to the fact that often even extensive forms are not recognized; that even with fluorescein staining the slit lamp is absolutely necessary to demonstrate minute lesions.

The reviewer considers every communication by Vogt of utmost importance. This present hypothesis must be verified. We must take a careful anamnesis regarding herpetic manifes-

tations on the body. It could very well be possible that the herpetic microbe would behave as for example the Morax-Axenfeld bacillus does in the conjunctival sac. We have no indication of a herpetic constitution and if one considers the stable epidemics in rabbits the herpes microbe seems to be ubiquitous. It is possible that the herpes microbe can lead a saprophytic life on human mucous membranes. It is of the utmost importance to verify the therapeutic effect of Vogt's abrasion. Reading between the lines it does not seem to prevent recurrence. The reviewer has had constant success with tincture of iodin; only in a limited number of cases he has had to make a second application. The essential question is early diagnosis, for as soon as the Bowman membrane has been pierced we seem to be powerless. When the process is limited to the superficial layers of the parenchyma, tincture of iodin stops the progress of the ulcer. Many a case of so called parenchymatous keratitis is really herpes. Even when the slit lamp shows glass fibers at the posterior corneal surface this is not a sign of previous luetic or tuberculous infection. The reviewer has an undoubted case of opacity of the entire corneal tissue which shows distinct glass fibers and which was treated some ten years ago for herpes corneæ.

Could it not be that the application of tincture of iodin to the corneal epithelium has the added advantage of sterilizing the conjunctival sac? It is certain that herpes corneae can be cured by local measures, without any constitutional treatment.

At any rate, we must be on the lookout for herpetic affections of the eye. for herpes produces many different clinical pictures, chiefly of the cornea. It should not be forgotten that it does not spare any age. Some cases of intractable socalled "scrofulous keratitis" are undoubtedly herpes.

E. E. B.

Dobson, Margaret. Ophthalmoscopy of the Macular Region by Red Free Light. Ophthalmological Congress, Oxford, 1926, July.

The author described and depicted various lesions seen at the macula by red free light.

She notes that the retina is transparent to red light, but when the red rays of the spectrum are cut off and the green rays allowed to pass, the retina becomes more visible and the choroid less so, by contrast.

In examining diseases of the choroid, red free light is therefore of no advantage, but the retina being more opaque when viewed by red free light, diseases of this membrane become much more evident, especially in the macular area, which is more transparent and more highly specialised than any other part of the fundus. The retinal blood vessels show up much more vividly by contrast, and all reflexes are markedly exaggerated.

Red free is a very loose term, and red free filters are very various. The only really red free light is that of a mercurial vapor lamp. This is unsuitable for ophthalmoscopic examination, as it causes intense irritation to both the eye of the observer and to the eye under examination.

The examination of the fundus oculi by red free light cannot be made satisfactorily with the ordinary luminous ophthalmoscope, as the source of light is not powerful enough for the green rays only of the spectrum to illuminate the retina.

When advanced destructive changes are present in the retina there is no advantage of using red free light, as these, together with any choroidal changes, are seen quite as distinctly with ordinary light of much less intensity. Very early changes in the macular region can, however, be detected, which are much less or not at all evident when looked for by ordinary light.

The author especially wished to emphasize that in order to see in detail macular changes, it is necessary to make use of the direct method of ophthalmoscopy. It is even more necessary to employ this method when examining the fundus with red free light.

The only two ophthalmoscopes which give sufficient light for the satisfactory examinations are, Salomonson's Photographic, which gives a

large area including the optic disc and the macular region; and Esdaile's Pointolite which is useful in examining small areas only at a time. L. T. P.

Rochat, G. F. Color Sense in Fishes. Nederl. Tjdschr. v. Gen., 1927, May 14.

The author used three specimens of Eupomotus Gibbosus born and raised in an aquarium. First he demonstrated that light or color without association with food did not have an influence, nor did there exist a congenital preference or dislike for light of a certain wave length.

The fishes were put in a rectangular aquarium, one wall of which was covered with black wooly paper, in which there were three round openings at the same height. Before each opening a small coniform bowl, made from white paper, rendered semitransparent with paraffin, was hung. Outside the aquarium behind each opening a miniature projection apparatus sent a parallel light bundle on the bowl. Each projection apparatus contained a disc with colored filters, by which in addition to colorless light, red, green, blue or yellow light could be obtained and all shades of light intensity could be had. From the inside of the aquarium the animals saw only the three bowls and the light which illuminated them. The fishes were fed during a few days many times a day from one bowl after another. Each time the bowl that contained the food was illuminated with red light

Soon in some of the fish the connection between red light and the probability of nourishment entered consciousness. They came out themselves toward the illuminated bowl before the food was put in it.

Three especially apt fishes were set aside and used for the further experiments. After a week it was possible to decide if the recognization were thru the color or only thru the intensity of the illumination. The fishes came always to the red illuminated bowl even when one or both the others were illuminated with colorless lights, irrespective of which showed the greatest intensity. A poorly illuminated red bowl beside two clear colorless ones was chosen with as great a certainty during many repeated experiments as a dark red at the side of a lighter or darker colorless bowl. The most convincing experiment is to illuminate a bowl with a low colorless beam and then gradually to increase the intensity of the colorless light. The fish remains quietly where it is. If now one of the other bowls is illuminated with a feeble red the fish darts toward it and remains before it.

The fish does not take notice of other colors, in varying intensity, but swims directly to the red bowl.

The experiments were done daily during two months with the same result.

With the precautions taken it seemed that color was certainly perceived.

The fish trained for red can choose between red and yellow; tests in which a color blind man failed.

The author concludes that fish possess distinctly a color sense, as von Frisch contended and Carl v. Hess denied. E. E. B.

Lea, J. A. Treatment of Trachoma by Acetic Acid. Brit. J. of Ophth., 1927, April, v. 11, p. 150.

The author's method (following cocainization) is to flush the everted lids with boric solution and with an instrument similar to a tattooing needle, after dipping the point into a 50% acetic acid solution, to prick every true granulation. The excess of acid is flushed away. This operation can be repeated two or three times a week and may be supplemented by the use of copper stick or silver nitrate. D. F. H.

Schoninger, L. Pterygium. Klin. M.f. Augenh., 1926, v. 77, p. 805.

The author describes his investigations with the slit lamp and the histologic changes of a pterygium in a patient who died from an intercurrent disease. Slit lamp and microscopic changes teach that pterygium is not to be classed under diseases of the conjunctiva, as in the text books, but belongs to corneal pathology. Pinguecula certainly is not its cause. The

author found the first changes in connection with the transit of a nerve thru Bowman's membrane a migrating cell thus entering Bowman's membrane. The epithelium is lifted as a minute vessel enclosing a fine homogeneous mass. Then the mass assumes a fibroid structure forming lamellae and Bowman's membrane is loosened into lamellae. From the limbus vessels with loose connective tissue advance into the most superficial lamellae. These must be removed in any operation. C. Z.

Weiss, Louis. Prophylaxis and Treatment of Ophthalmia Neonatorum. Jour. of the Medical Society of New Jersey, 1927, May, v. 24, no. 5, p. 290.

The author thinks that in addition to prenatal precautions, the most important element in prophylaxis is the careful cleansing of the lids and adnexa after birth and the instillation of 4% cocain solution into the lower conjunctiva sac once daily for seven days.

In case the disease develops he advocates continual cleansing of the lids and cocain instillations every two hours. L. T. P.

Thiel, R. Influence of Ergotamin on Ocular Tension in Glaucoma. Klin. M.f. Augenh., 1927 v. 77, p. 753.

After intravenous injection of ergotamin in rabbits paralysis of the sympathetic nerve terminals in the iris was observed. So far no substance is known which after subcutaneous injection or per os can approach the depressing effect on intraocular pressure of ergotamin. It mainly produces paralysis of the sympathetic nerve terminals in the interior of the eye. The immediate consequences of this paralysis is the altered permeability of the uveal vessels. It must be assumed that the secretion of the ciliary body is thereby impeded. Primary glaucoma simplex is best adapted for ergotamin. It also promises results in those forms of secondary glaucoma in which the hypertension is caused by hyperemia of the vessels of the iris and ciliary body and subsequent exudation into the aqueous. C. Z.

Weekers, L. Phlyctenular Disease and Tuberculosis. Arch. d'Ophtal. 1927, June, v. 44, p. 14.

One hundred and fifty-six children affected with phlyctenular disease were examined. In fifty-six percent a definite history of tuberculosis in the family was found. In thirty-six there was coexistance of active tuberculosis lesions with the phlyctenular disturbance. The von Pirquet reaction was positive in ninety percent of those under fifteen years of age in contrast to a positive reaction of only sixty-one percent in a similar group without phlyctenules. The presence of phlyctenules indicates a tuberculous infection which usually ends with development of immunity. There seems to be no doubt in the author's mind that phlyctenulosis is a manifestation of tuberculous infection. M. F. W.

Smith, Priestley. Movement of the Intraocular Fluid. Brit. J. of Ophth., 1927, v. 11, p. 263.

The author discusses quite fully the recent hypotheses which are opposed to Leber's original teaching, relative to this subject. Weiss', Henderson's, Starling's, and more recently Duke-Elder's investigations have attracted considerable attention.

It seems to the author that the dissentients, relying on the findings of physicochemistry, attach too little weight to clinical observation; that their attitude for the most part is too exclusive. Thus Weiss attributes the renewal process wholly to molecular force, and looks to the biochemistry of the future to explain what cannot yet be explained on that basis; he neither admits nor denies a continuous movement of the fluid. Magitot entirely denies the existence of such movement. Duke-Elder begins his valuable treatise with a strongly subversive argument, but later makes considerable concession to old beliefs.

Subject to correction, Priestley Smith submits that we are fully justified in maintaining that under the influence of two opposing forces the fluid moves slowly and continuously thru the chambers; that the ciliary capil-

laries emit the fluid because their blood pressure is high enough to overcome the osmotic force, while Schlemm's canal and the iris veins absorb it because here the blood pressure is lower and the osmotic force prevails.

D. F. H.

Wick, W. Protein Therapy in Eye Diseases. Archiv f. Ophth. 1927, 118 Band, p. 221.

The author reports results in 300 cases of ocular disorders treated by protein therapy during a period of three and one-half years. The character of the ocular disturbance varied between a simple conjunctivitis and the most serious central changes. A good result was obtained in 61% and a failure recorded in 39%. The external diseases of the eye involving eyelids, conjunctiva, cornea and sclera were influenced more by this treatment than diseases of the inner ocular structures with the exception of iritis and iridocyclitis. Acute diseases are usually better influenced than chronic ones.

In 40 of these cases, there were noted and plotted in a curve changes in the temperature, red blood cells and leucocytes produced by the protein injections. The injections generally caused an increase of temperature, polymorphonuclear neutrophilic leucocytes and the leucocyte index with a simultaneous diminution of the lymphocytes. It was found that where longer intervals between injections occurred the results were better; thus in 37 cases injected every sixth day the percentage of improved cases was 73, whereas in 19 cases taking the injection every day there were 26% of the cases improved.

Nine different remedies were used in the injections — milk, yatren-casein staphyloyatren, omnadin, caseosan, olobintin, perprotasin, aolan and the patient's blood. Altho milk produced increased temperature more frequently by far than any of the other remedies, yet improvement of the eye trouble occurred in rather similar amount with any of the remedies. H. D. L.

Suganuma, S. Tuberculous Sclerokeratitis. Klin. M. f. Augenh., 1926, v. 77, p. 787.

Three reported cases were of different stages. The pericorneal and episcleritic prominence in the first case consisted histologically of several tubercles with central caseation, from which cell infiltrations ran into the cornea forming a spindle shaped opacity with a tubercle behind it that appeared clinically as a grayish white nodule. Between the ciliary body and sclera was another tuberculous focus connected with a perivascular cell infiltration with the sclerotic focus. The sclerotic focus seldom ulcerates, but is generally absorbed. The third case showed tubercles in the anterior layer of the cornea appearing as miliary grayish-white nodules. Formerly the patient had suffered from relapsing phlyctenulae in the limbus. Here the anterior and posterior ciliary vessels anastomose and the lymph paths of the sclera and cornea meet. Therefore bacilli may easily accumulate intravascularly or perivascularly in the lymph spaces. C. Z.

Traquair, H. M. Visual Field Changes in Pregnancy. Brit. J. of Ophth., 1927, v. 11, p. 271.

This contribution discusses in considerable detail the recent observations made by Finlay, Maud Carvill, Washington Congress, 1922, and Abramowicz in January, 1927, Brit. J. of Ophth. The critic's conclusion is that unless the bitemporal hemianopic contraction shows in addition an upper outer quadrantal defect in the color field, it is to be taken as negative evidence of hypophyseal pressure. Temporal restriction of the field is quite a common psychic defect. D. F. H.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply news from their respective sections: Dr. H. Alexander Brown, San Francisco; Dr. Wm. Thornwall Davis, Washington; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. George H. Kress, Los Angeles; Dr. Edward D. LeCompte, Salt Lake City; Dr. W. H. Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Charles P. Small, Chicago; Dr. G. McD. VanPoole, Honolulu.

DEATHS.

Dr. Davis Isaacs of Omaha, aged fifty, died June twenty-fifth at Rochester, Minn., of brain tumor.

Dr. Frank L. Henderson, of St. Louis, died May 13th, 1927, at Stonington, Conn., from a heart attack.

Dr. Luigi Maucione died recently in Naples, Italy. He was a collaborator of the Clinica Oculistica since 1913.

PERSONALS.

Dr. Samuel A. Durr announces the removal of his office to the Medico-Dental Building of Los Angeles.

Dr. Wm. G. Reeder has been appointed to the Chair of Ophthalmology at Rush Medical College, Chicago.

Dr. William A. Sedwick of Denver, Colorado, was installed as President of the Colorado State Medical Society, September 6th at Glenwood Springs.

Dr. Harvey J. Howard of Peking, China, arrived in New York with his family on September 17th, after a nearly four months' tour of the Orient and Europe. Until further notice his address will be The Rockefeller Foundation, 61 Broadway, New York City.

Dr. Albert Lemoine, of Kansas City, has found it necessary to cancel his trip to Europe, due to the illness of his mother. His reservations and work in Vienna were taken over by Dr. E. N. Robertson of Concordia, Kansas.

MISCELLANEOUS.

During the year 1926 Harvard University received gifts of $6,003,372.00. Of this $188,400 was from the General Educational Board, for the Department of Ophthalmology.

Dr. Carlos Finlay, Professor of Ophthalmology of the University of Havana, is visiting medical institutions in this country, under the auspices of the Rockefeller Foundation.

As a result of a joint discussion, on July twenty-ninth, between the Wisconsin Industrial Commission, employers of labor, insurance companies, and oculists, Wisconsin will soon have the most just, equable, scientific and common sense method of dealing with this problem that is possessed and practiced by any state in the union.

The American College of Physical Therapy announces its 1927, the sixth annual clinical meeting, to be held at the Hotel Sherman, Chicago, October 1st to November 5th. One day will include a section on Eye, Ear, Nose and Throat Surgery. Program and information may be obtained from The Chairman, 820, 30 N. Michigan Avenue, Chicago, Illinois.

The New York State Commission for the Blind, with the assistance of twenty organizations concerned with the care of the blind, assembled an educational exhibition of work for and by the blind residents of the state at the Art Center, 65 East Fifty-Sixth Street, New York City. The exhibition covered almost the entire ground floor of the Art Center, and it showed the handicaps under which the blind labor and the extent to which they succeed in overcoming them. The exhibit provided by the National Committee for the Prevention of Blindness showed how these handicaps may be avoided. There were exhibits in braille of music, books and magazines; a chart showing that the American Foundation for the Blind had distributed 2,500 radio sets to the needy blind thruout the country; a graphic chart showing that industrial accidents caused the loss of sight of one out of seven blind persons, and that venereal diseases blind or visually handicap thousands of persons. There was an exhibit of the handiwork of blind persons who help to support themselves by making toys, doll wigs, mops and brooms, or by sewing and other forms of needle work.

The American Ophthalmological Society at its meeting in Quebec unanimously awarded the Lucien Howe Medal to Mr. Priestley Smith, and commissioned Dr. W. H. Wilder to present it personally. On August 18th Dr. Wilder visited Mr. Priestley Smith at Birmingham, and gave him the beautiful gold cross. He spent some time with our distinguished colleague, examining his wonderful injections of the eye of the ox, and studying the apparatus with which Mr. Priestley Smith is carrying on his investigations regarding the circulation of the eye. The Howe Medal is awarded at infrequent intervals, and has now been given four times. The first recipient was Dr. Koller, who introduced the use of cocain into the surgery of the eye. The second was Professor Fuchs of Vienna, and the third Dr. Edward Jackson. We congratulate Mr. Priestley Smith upon this recognition of the valuable work he has done, particularly with regard to glaucoma.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in *heavy-faced type*. The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper.

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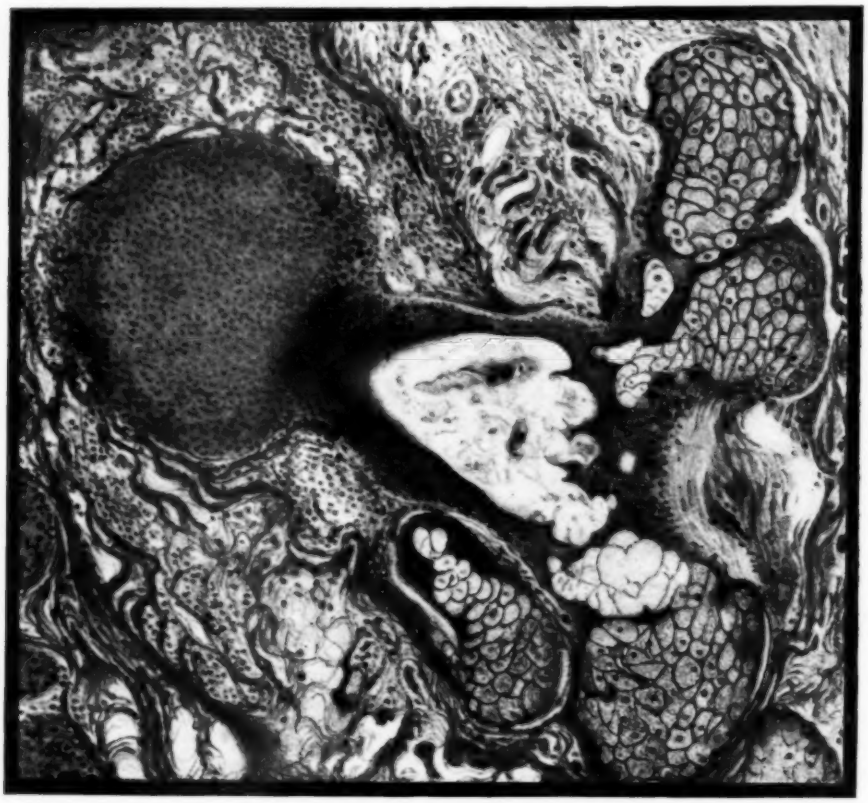

FIG. 1—SECTION THROUGH SKIN IN VICINITY OF SEBACEOUS GLAND, SHOWING FRAGMENTS OF THELAZIA CALLIPAEDA LARVAE IN DUCT. X 95.

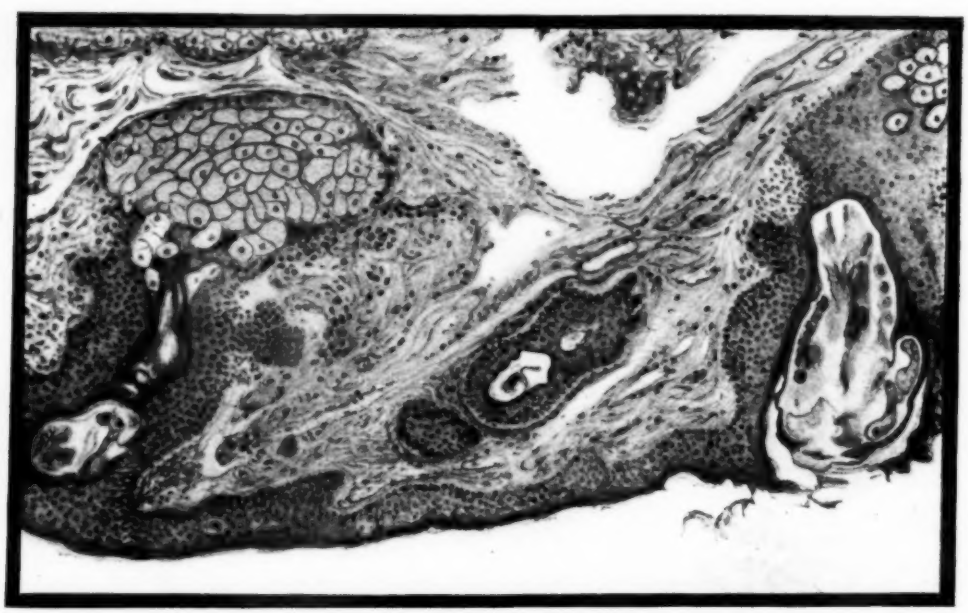

FIG. 2—ADJACENT AREA FROM SAME SECTION, FRAGMENTS OF THELAZIA CALLIPAEDA LARVAE (LEFT), IN DUCT LEADING INTO SEBACEOUS GLAND, SINGLE LARVA (CENTER) IN DUCT, AND NEST OF LARVAE (RIGHT) IN EPITHELIAL POCKET. X 95.

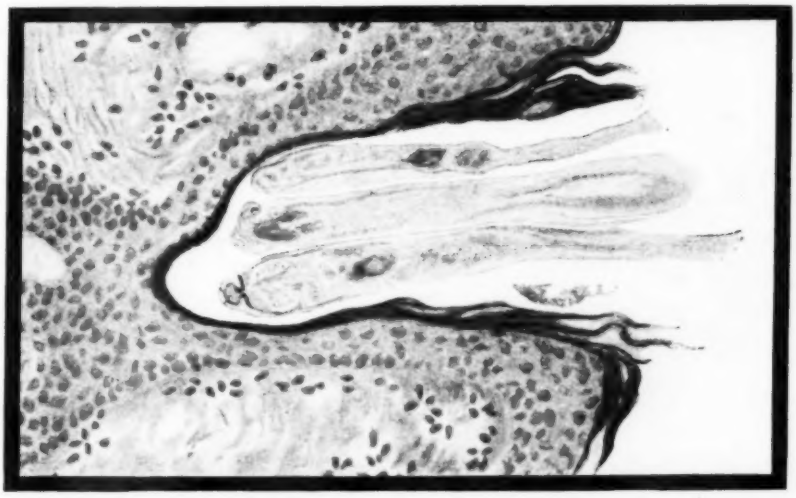

FIG. 3—DETAIL OF THREE THELAZIA CALLIPAEDA LARVAE IN SECTION OF EPITHELIAL POCKET FROM SAME CASE AS FIGS. 1 AND 2. THE ANTERIOR ENDS OF THE WORMS ARE AT THE INNER END OF THE POCKET. THE BUCCAL CAPSULE IS SHOWN IN THE LOWERMOST ONE. X 800.

FIG. 4—DETAIL THROUGH ANOTHER EPITHELIAL FOLD, STRONGLY CORNIFIED, SHOWING PORTIONS OF THELAZIA CALLIPAEDA LARVAE IN SECTION. THEIR HEADS ARE DIRECTED INWARD. THE INTEGUMENT OF THE LARVA SHOWS THE CHARACTERISTIC SERRATED PSEUDO-SEGMENTATION. X 800.